TABLES

SHOWING

LOSS OF HEAD

DUE TO

FRICTION OF WATER

IN PIPES.

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AUTHOR'S PREFACE.

ABOUT twenty years ago, when the author first commenced to make a practical application of hydraulic formulas, he was unable to find one for calculating the loss of head due to the friction of water flowing in pipes, that he had not heard criticised more or less unfavorably by hydraulic engineers.

This unsatisfactory state of affairs led him to commence to make special investigations upon the subject, and to collect original data of an experimental nature relating to the same, in order to prove to his own satisfaction, if possible, if any of the formulas that he was familiar with, were reliable for general use, and, if not, to endeavor to construct one.

The data of five hundred and twenty experiments, that had been made by twenty-six different investigators, were obtained.

A careful study of these experimental data con-

vinced the author that the same formula would not apply to all cases, and that in order to make an intelligent investigation, it would be necessary to divide the data into the three following classes, viz., that which had been obtained with pipes having very smooth interior sides similar to lead and brass pipes, that which had been obtained with pipes having interior sides similar to new cast-iron pipes, and that which had been obtained with pipes having interior sides similar to old cast-iron pipes whose interior sides had become roughened by oxidation.

The result of this division, was the construction by the author of a new formula* for the flow of water in pipes having very smooth interior sides similar to lead and brass pipes, and his coming to the conclusion that two formulas* constructed by an eminent French Civil Engineer, the late Henry Darcy, were very well adapted for pipes having interior sides similar to new cast-iron pipes.

The formula for smooth pipes by the author,

* Transactions Am. Society Civil Engineers, Vol. XXII., 1890.

which was used in computing Table No. 1, was constructed from the results of two hundred and thirty-eight experiments, that were made with twenty-seven different pipes, having very smooth interior sides, ranging from one-half inch to three and one-fourth inch in diameter.

The formulas for new cast-iron pipes, etc., by Darcy, which were used in computing Table No. 2, were verified by the author by comparing them with the results of one hundred and forty-eight experiments that were made with twenty-five different pipes, having interior sides similar to new cast-iron pipes, ranging from three and one-quarter inch to ninety inch in diameter.

A general formula was not discovered which would satisfactorily apply to old cast-iron pipes having interior sides that had become roughened by oxidation and it was not possible to construct one from the limited data at hand. The author has, however, given in Table No. 2, a series of multipliers which can be used, for preliminary work, in connection with the table, for very approximately estimating the increase in the loss of head due to friction which may

take place in pipes that have been in service five or more years. These multipliers have been recently computed by a modification of one of Darcy's formulas for new pipes by the author, in which a formula by Darcy for old pipes and the results of a number of experiments made with pipes that had been in service from about two to about seventeen years were taken into consideration.

Darcy's formulas for new pipes are safe and reliable formulas for determining the size of water mains. It is the opinion of some engineers, that they represent more accurately the flow of water in pipes that have been in service a short time than they do the flow of water in absolutely new and clean pipes.

The only criticism of moment, which is likely to be made in regard to an engineer who uses Darcy's formulas for new pipes, for determining the size of supply and distribution pipes, is, that his estimates of cost are too high. A criticism of this kind, however, generally helps the reputation of an engineer, as it is apt to give the impression that he is a safe man. The

engineer, on the contrary, who tries to figure out the size of a pipe to the lowest possible limit on account of first cost, if the pipe does not come up to the capacity for which it was intended, is very likely to be blamed for having made a mistake, and his well meant intentions relative to first cost, are, in the majority of cases, ridiculed instead of being praised.

A first edition of each of the tables, which were arranged and computed under the personal direction of the author, was first published as an appendix to an Annual Report of the City Engineer of Providence, R. I.; viz., Table No. 1, in 1890, and Table No. 2, in 1888. The tables were reprinted in 1892, by permission, by the Massachusetts Institute of Technology for the use of its Students in Civil Engineering.

The tables have been revised and enlarged by the author since the above mentioned editions were published, and this edition contains the tables as revised and enlarged.

EDMUND B. WESTON.

PROVIDENCE, R. I., *April*, 1896.

CONTENTS.

TABLE No. 1,

SHOWING THE LOSS OF HEAD DUE TO THE FRICTION OF WATER IN PIPES HAVING VERY SMOOTH INTERIOR SIDES SIMILAR TO LEAD AND BRASS PIPES.

This table shows the Loss of Head due to the Friction of Water flowing in Pipes having very Smooth Interior Sides similar to Lead and Brass Pipes, under different conditions of Velocity and Discharge, or the Inclination neecessary to maintain the given Velocity and Discharge. The table also gives the Head required to produce the given Velocity, and the Loss of Head due to the Orifice of Influx.

The table includes pipes of ½-inch, ⅝-inch, ¾-inch, 1-inch, 1¼-inch, 1½-inch, 2-inch, 2½-inch and 3-inch in diameter.

The mean internal diameter of the pipe, that each page of the table refers to, is given at the head of each page.

The first column of the table gives the mean

velocity, in feet per second, of the water flowing in the pipe.

The second column gives the head required to produce the velocity in the first column, calculated by the laws of falling bodies, independent of friction, loss of head due to influx, and other retarding causes. The following expression was used in calculating the results in this column:

$$\text{Head required to produce velocity} = \frac{v^2}{2g}.$$

The third column gives the discharge in U. S. gallons per minute, and the fifth column the discharge in U. S. gallons per twenty-four hours, when the water is flowing in the pipe with the velocity given in the first column.

The fourth column gives the loss of head, or the resistance, per 100 feet, arising from the friction of the water against the interior sides of the pipe, when the velocity of flow is the same as the velocity in the first column, and the discharge the same as the discharge in the third and fifth columns. This loss of head is also equivalent to the inclination, or slope, on

which it would be necessary to lay the pipe in order to maintain the given velocity and discharge. The results in this column were computed by Weston's formula.* The formula, *which must only be applied to pipes having interior sides similar to lead and brass pipes from one-half inch to three and one-half inches in diameter*, is as follows:

$$h = \left(0.0126 + \frac{0.0315 - d\,0.06}{\sqrt{v}}\right)\frac{l}{d}\,\frac{v^2}{2g}.$$

In which h = the loss of head due to friction, in feet.

d = the internal diameter of the pipe, in feet.

v = the velocity per second, in feet.

l = the length of the pipe, in feet.

$2g = 64.324$.

When the mean velocity, discharge, and diameter of the pipe are constant, the loss of head due to friction is directly and simply as the length, consequently the loss of head

* Transactions, Am. Society of Civil Engineers, Vol. XXII., 1890.

due to friction for any length of pipe can be readily determined from the table.

The sixth column gives the loss of head due to the entrance of the water into the pipe, with the velocity in the first column, when the edges of the inlet end of the pipe are square and flush with the face of a wall or partition. The following formula was used in calculating the results in this column:

$$\text{Loss of head due to influx} = 0.505 \frac{v^2}{2g}.$$

If the pipe is connected with a reservoir, in the manner mentioned in the description of the sixth column, and laid below the hydraulic grade line, the sum of the results given in the second, fourth, and sixth columns, is the total head, or the head that will be required to generate the velocity in the first column, and the discharge in the third and fifth columns.

The table can also be used to ascertain approximate losses of head due to friction, and the velocities corresponding to the same, beyond the highest limits of the table, by the application

of the following rule: the diameter and length of the pipe being constant, the loss of head varies as the square of the velocity and conversely the velocity as the square root of the loss of head. The results obtained in this manner, in connection with the table, will necessarily be approximate, as the coefficient of friction included in the formula used in computing the table, is dependent upon both the diameter and the square root of the velocity. The results obtained by determining the loss of head due to friction, by the square of the velocity, will be in excess of what the formula will give: for a loss of head of 3,000 feet, due to friction, in a pipe 100 feet long, for the diameters given in the table, it would average about eight per cent. more; and the results obtained by determining the velocity by the square root of the loss of head due to friction, will not be as much as the formula will give: for a velocity corresponding to a loss of head of 3,000 feet, due to friction, in a pipe 100 feet long, for the diameters given in the table, it would average about four per cent. less. For a loss of head less than 3,000

feet, due to friction, in a pipe 100 feet long, and its corresponding velocity, the error in a result obtained in this manner would be proportionally less. It should be borne in mind, however, that in determining a loss of head due to friction or a velocity, beyond the limits of the table by using the square of the velocity or the square root of the loss of head due to friction, *that in each instance the highest velocity or loss of head due to friction* (*for each diameter*) *given in the table must be used as the base of computation*, in order to obtain the most reliable result.

Following the table there is a supplementary table of theoretical velocities which is to be used in conjunction with the table, for obtaining approximate results, when the results desired are beyond the highest limits of the results given in the table.

It may seem in first looking over the table, as though it contained in some instances losses of head due to friction which extend far beyond the range of practical application, especially in regard to pipes of small diameter. This would undoubtedly be the fact if the table was only

intended to cover lengths of pipe of 100 feet or over, such, however, as has previously been explained, is not the case, the table having been arranged for determining results for pipes less than 100 feet in length as well as for pipes more than 100 feet in length. For instance, the total head from the table corresponding to a velocity of 50 feet, for a ½-inch pipe 100 feet long, = 1,573 + 39 + 20, = 1,632 feet, and it might be said with very good reason that a pipe of this size discharging under such a high head as 1,632 feet would never be met with in actual experience, unless, possibly, in a most exceptional case; but a ½-inch pipe 10 feet long discharging under a total head of 1,573 ÷ 10, + 39 + 20 = 216 feet, is not such an unusual occurrence. One of the principal objects, that was borne in mind when the table was being arranged, was to make it, as far as was practicable, so that even exceptional problems could be readily solved.

In using the table when other lengths of pipe than 100 feet are to be taken into consideration, as well as for cases when the results desired

are beyond the highest limits of the table, it will probably be necessary, in some instances, especially for a person who is not in the habit of making hydraulic calculations, to make several trials before the correct result is obtained. A little practice, however, will perceivably facilitate the use of the table.

The following examples illustrate a number of ways in which the information contained in the table can be applied, for obtaining results which are not given in the table:

Positive results can be obtained in the manner shown by examples Nos. 1, 2 and 3, as the rule applied in order to obtain them, is: when the mean velocity, discharge, and diameter of the pipe are constant, the loss of head due to friction is directly and simply as the length of the pipe. Approximate results, only, however, can be obtained in the manner shown by examples Nos. 4 and 5, as the results will be beyond the highest limits of the table and the rule applied in order to obtain them: the diameter and length of the pipe being constant the loss of head due to friction varies as the

square of the velocity and conversely the velocity as the square root of the loss of head due to friction, is, in the present instance, for reasons previously mentioned, an approximate rule.

Example No. 1.

Question. What will be the diameter of a pipe which will supply a boiler, carrying 60 pounds of steam to the square inch, 50,000 gallons of water per 24 hours, the elevation of the reservoir which will supply the water being 167 feet above the boiler and the length of pipe 100 feet?

Answer. The loss of head in this case must not exceed 167—139 (which is the head equivalent to 60 pounds), = 28 feet. The table shows that a 1¼-inch pipe will deliver 49,680 gallons of water per 24 hours, under a total head of 27.40 feet

$$(25.50, + \left(\frac{v^2}{2g} = \right) 1.26, + \left(\frac{v^2}{2g} \times 0.505 = \right) 0.64).$$

This result checks within 0.60 of a foot (28 — 27.40), which is as near as can be ob-

tained from the table. Therefore a pipe 1¼-inch in diameter is the pipe required.

Example No. 2.

Question. What will be the diameter of a pipe which will supply a boiler, the conditions being the same as given in the question for Example No. 1, with the exception, that the quantity of water required is 40,000 gallons and the length of the pipe 40 feet?

Answer. The ratio of the lengths used in computing the table, to the given length, $\frac{100}{40}$, $= 2.5$, $2.5 \times 28 = 70$ feet. The table shows that the discharge of a 1-inch pipe corresponding to a friction head of 60.10 feet is 44,640 gallons of water per 24 hours, the inverse ratio of the lengths, $\frac{40}{100}$, $= 0.4$, $0.4 \times 60.10 = 24.04$, $24.04, + \left(\frac{v^2}{2g} =\right) 2.49, + \left(\frac{v^2}{2g} \times 0.505 =\right) 1.26$, $=$ a total head of 27.79 feet. This result checks within 0.21 feet $(28 - 27.79)$, which is as near as can be obtained from the table.

Therefore a pipe 1-inch in diameter is the pipe required.

EXAMPLE No. 3.

Question. What will be the discharge from a reservoir in gallons per minute, through a 1-inch pipe 200 feet long, under a total head of 300 feet?

Answer. The ratio of the length used in computing the table to the given length, $\frac{100}{200}, = 0.50, \quad 0.50 \times 300 = 150$ feet. The table shows that the discharge of a 1-inch pipe corresponding to a friction head of 143.91 is 50.00 gallons per minute; the inverse ratio of the lengths, $\frac{200}{100}, = 2.0, \quad 2.0 \times 143.91 = 287.82,$

$287.82, + \left(\frac{v^2}{2g} =\right) 6.48 + \left(\frac{v^2}{2g} \times 0.505 = \right) 3.27, =$ a total head of 297.57 feet. This result checks within 2.43 feet (300 — 297.57), which is as near as can be obtained from the table. Therefore a pipe 1-inch in diameter and 200 feet long, under a total head of 300 feet, will discharge 50.00 gallons of water per minute.

Example No. 4.

Question. What will be the approximate discharge from a reservoir, in gallons per minute, through a 3-inch pipe 100 feet long under a total head of 500 feet?

Answer. The friction head given in the table opposite to the velocity of 50 feet is 233 feet, and the total head, 233, $+\left(\frac{v^2}{2g}+\frac{v^2}{2g}\times 0.505=\right)$ 59, = 292 feet. As a total head of 292 feet will produce a velocity of 50 feet, assume 70 feet as the increased velocity which would be produced by 500 feet, the given total head. The supplementary table of theoretical velocities shows that $\frac{v^2}{2g}$ for a velocity of 70 is 76 feet and $\frac{v^2}{2g}\times 0.505 = 38$ feet, $76+38=114$ feet, $500-114=386$ feet, which is to be used as an assumed friction head; the square root of the assumed friction head 386 divided by the square root of 233, the friction head taken from the table, corresponding to 50, the highest velocity, $=\frac{19.65}{15.26}=1.29$, 1.29×50 (the velocity from

the table), = 64.5 feet, which is the resultant velocity, $\frac{v^2}{2g}+\frac{v^2}{2g}\times 0.505$ for a velocity of 64.5, is found by the aid of the supplementary table of theoretical velocities to be 98 feet, 98 + 386 (the assumed friction head for a velocity of 70 feet), = a total head of 484 feet. If the assumed velocity had been the actual velocity this 484 would have been equal to 500 the given total head, and the resultant velocity 64.5 the same as 70, the assumed velocity, and as their differences are so great (500 — 484 = 16 and 70 — 64.5 = 5.5), it will be necessary to make, at least, one more trial.

For the second trial assume a velocity of 66 feet. The supplementary table of theoretical velocities shows that $\frac{v^2}{2g}+\frac{v^2}{2g}\times 0.505$ for a velocity of 66 is 102 feet, 500 — 102 = 398 feet; the square root of the assumed friction head 398 divided by the square root of 233, the friction head taken from the table corresponding to 50, the highest velocity, $=\frac{19.95}{15.26}=1.31$, $1.31\times$

50 (the velocity from the table), = 65.5 feet which is the resultant velocity, $\frac{v^2}{2g} + \frac{v^2}{2g} \times 0.505$ for a velocity of 65.5 is found by the aid of the supplementary table of theoretical velocities to be 101 feet, 101 + 398 (the assumed friction head for a velocity of 66 feet), = a total head of 499 feet. This result is sufficiently near as the total heads check to within 1 foot (500 — 499) and the velocities to within 0.5 feet (66 — 65.5). To obtain the discharge in gallons per minute, multiply 1,104 (the gallons per minute given in the table corresponding to a velocity of 50), by 1.31 (the ratio of the square roots of the friction heads), $1{,}104 \times 1.31 = 1{,}446$ gallons. Therefore a 3-inch pipe 100 feet long, under a total head of 500 feet will discharge 1,446 gallons per minute.

Example No. 5.

Question. What will be the approximate discharge from a reservoir, in gallons per minute, through a 3-inch pipe 10 feet long, under a total head of 300 feet?

Answer. The inverse ratio of the length used in computing the table to the given length, $\frac{10}{100}$, $= 0.10$, 233 feet is the friction head given in the table opposite to the velocity of 50 feet, $233 \times 0.10 = 23.3$ feet, the friction head in a pipe 10 feet long corresponding to a velocity of 50 feet, and the total head, $23.3 + \left(\frac{v^2}{2g} + \frac{v^2}{2g} \times 0.505 =\right) 59$, $= 82.3$ feet. As a total head of 82.3 feet will produce a velocity of 50 feet, assume 100 feet as the increased velocity which would be produced by 300 feet, the given total head. The supplementary table of theoretical velocities, shows that $\frac{v^2}{2g}$ for a velocity of 100 is 155 feet and $\frac{v^2}{2g} \times 0.505 = 78$ feet, $155 + 78 = 233$ feet, $300 - 233 = 67$ feet, which is to be used as an assumed friction head; 67 multiplied by the ratio of the lengths, $\frac{100}{10}$, $= 10$, $= 670$ feet; the square root of the assumed friction head 670 divided by the square root of 233, the friction head taken from the table corresponding to 50,

the highest velocity, $= \frac{25.88}{15.26} = 1.7$, 1.7×50 (the velocity from the table), $= 85$ feet which is the resultant velocity, $\frac{v^2}{2g} + \frac{v^2}{2g} \times 0.505$ for a velocity of 85 is found by the aid of the supplementary table of theoretical velocities to be 169 feet, $169 + 67$ (the assumed friction head for a velocity of 100 feet in a pipe 10 feet long), $=$ a total head of 236 feet. If the assumed velocity had been the actual velocity, this 236 would have been equal to 300 the given total head, and the resultant velocity 85 the same as the assumed velocity 100, and as their differences are so great ($300 - 236 = 64$ and $100 - 85 = 15$), it will be necessary to make, at least, one more trial.

For the second trial assume a velocity of 96 feet. The supplementary table of theoretical velocities shows that $\frac{v^2}{2g} + \frac{v^2}{2g} \times 0.505$ for a velocity of 96 is 215 feet, $300 - 215 = 85$ feet, $85 \times \frac{100}{10}$, $= 850$ feet; the square root of

the assumed friction head 850 divided by the square root of 233, the friction head taken from the table corresponding to 50, the highest velocity, $= \frac{29.15}{15.26}$, $= 1.91$, 1.91×50 (the velocity from the table), $= 95.5$ feet, which is the resultant velocity, $\frac{v^2}{2g} + \frac{v^2}{2g} \times 0.505$ for a velocity of 95.5 is found by the aid of the supplementary table of theoretical velocities to be 214 feet, $214 + 85$ (the assumed friction head for a velocity of 96 feet in a pipe 10 feet long), $=$ a total head of 299 feet. This result is sufficiently near as the total heads check to within 1 foot (300 — 299) and the velocities to within 0.5 feet (96 — 95.5). To obtain the discharge in gallons per minute, multiply 1,104 (the gallons per minute given in the table corresponding to a velocity of 50), by 1.91 (the ratio of the square roots of the friction heads), $1{,}104 \times 1.91 = 2{,}109$ gallons. Therefore a 3-inch pipe 10 feet long, under a total head of 300 feet, will discharge 2,109 gallons per minute.

DIAMETER ONE-HALF INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 100 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
0.41	0.00	0.25	0.37	360	0.00
0.82	0.01	0.50	1.13	720	0.01
1.23	0.02	0.75	2.21	1,080	0.01
1.63	0.04	1.00	3.53	1,440	0.02
2.04	0.06	1.25	5.14	1,800	0.03
2.45	0.09	1.50	6.94	2,160	0.05
2.86	0.13	1.75	9.19	2,520	0.06
3.27	0.17	2.00	11.45	2,880	0.08
3.68	0.21	2.25	13.95	3,240	0.11
4.08	0.26	2.50	16.83	3,600	0.13
4.49	0.31	2.75	19.78	3,960	0.16
4.90	0.37	3.00	22.93	4,320	0.19
5.31	0.44	3.25	26.62	4,680	0.22
5.72	0.51	3.50	30.15	5,040	0.26
6.13	0.58	3.75	33.93	5,400	0.30
6.54	0.66	4.00	38.30	5,760	0.34
6.94	0.75	4.25	42.41	6,120	0.38
7.35	0.84	4.50	47.17	6,480	0.42
7.76	0.94	4.75	51.68	6,840	0.47
8.17	1.04	5.00	56.53	7,200	0.52
8.58	1.14	5.25	61.80	7,560	0.58
8.99	1.26	5.50	66.94	7,920	0.63
9.40	1.37	5.75	72.53	8,280	0.69
9.80	1.49	6.00	78.48	8,640	0.75

DIAMETER ONE-HALF INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 100 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
10.21	1.62	6.25	84.79	9,000	0.82
10.62	1.75	6.50	90.90	9,360	0.89
11.03	1.89	6.75	97.14	9,720	0.96
11.44	2.03	7.00	103.52	10,080	1.03
11.85	2.18	7.25	110.03	10,440	1.10
12.25	2.33	7.50	117.58	10,800	1.18
12.66	2.49	7.75	124.39	11,160	1.26
13.07	2.66	8.00	131.30	11,520	1.34
13.48	2.82	8.25	138.99	11,880	1.43
13.89	3.00	8.50	146.85	12,240	1.51
14.30	3.18	8.75	154.12	12,600	1.61
14.71	3.36	9.00	163.09	12,960	1.70
15.11	3.55	9.25	171.22	13,320	1.79
15.52	3.74	9.50	179.74	13,680	1.89
15.93	3.95	9.75	188.42	14,040	1.99
16.34	4.15	10.00	197.25	14,400	2.10
16.75	4.36	10.25	207.27	14,760	2.20
17.16	4.58	10.50	215.34	15,120	2.31
17.57	4.80	10.75	225.76	15,480	2.42
17.97	5.02	11.00	233.74	15,840	2.54
18.38	5.25	11.25	244.53	16,200	2.65
18.79	5.49	11.50	254.24	16,560	2.77
19.20	5.73	11.75	265.46	16,920	2.89
19.61	5.98	12.00	275.48	17,280	3.02

DIAMETER ONE-HALF INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 100 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
20.02	6.23	12.25	285.63	17,640	3.15
20.42	6.48	12.50	297.16	18,000	3.27
20.83	6.75	12.75	305.97	18,360	3.41
21.24	7.01	13.00	318.13	18,720	3.54
21.65	7.29	13.25	328.79	19,080	3.68
22.06	7.57	13.50	341.36	19,440	3.82
22.47	7.85	13.75	354.16	19,800	3.96
22.88	8.14	14.00	363.30	20,160	4.11
23.28	8.43	14.25	376.11	20,520	4.25
23.69	8.72	14.50	387.38	20,880	4.41
24.10	9.03	14.75	400.91	21,240	4.56
24.51	9.34	15.00	412.42	21,600	4.72
24.92	9.65	15.25	426.34	21,960	4.88
25.33	9.97	15.50	440.48	22,320	5.04
25.74	10.30	15.75	452.38	22,680	5.20
26.14	10.62	16.00	466.55	23,040	5.36
26.55	10.96	16.25	478.67	23,400	5.53
26.96	11.30	16.50	493.57	23,760	5.71
27.37	11.65	16.75	508.70	24,120	5.88
27.78	12.00	17.00	521.17	24,480	6.06
28.19	12.35	17.25	536.67	24,840	6.24
28.59	12.71	17.50	548.96	25,200	6.42
29.00	13.07	17.75	564.82	25,560	6.60
29.41	13.45	18.00	580.90	25,920	6.79

DIAMETER ONE-HALF INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 100 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
29.82	13.82	18.25	593.89	26,280	6.98
30.23	14.21	18.50	610.33	26,640	7.17
30.64	14.60	18.75	623.50	27,000	7.37
31.05	14.99	19.00	640.30	27,360	7.57
31.45	15.38	19.25	656.90	27,720	7.77
31.86	15.78	19.50	670.35	28,080	7.97
32.27	16.19	19.75	687.72	28,440	8.18
32.68	16.60	20.00	701.32	28,800	8.38
33.09	17.02	20.25	719.03	29,160	8.60
33.50	17.45	20.50	736.96	29,520	8.81
33.91	17.88	20.75	755.11	29,880	9.03
34.31	18.30	21.00	773.02	30,240	9.24
34.72	18.74	21.25	787.11	30,600	9.46
35.13	19.19	21.50	805.81	30,960	9.69
35.54	19.64	21.75	820.01	31,320	9.92
35.95	20.09	22.00	839.04	31,680	10.15
36.36	20.55	22.25	858.29	32,040	10.38
36.76	21.01	22.50	877.28	32,400	10.61
37.17	21.48	22.75	896.96	32,760	10.85
37.58	21.96	23.00	911.59	33,120	11.09
37.99	22.44	23.25	931.58	33,480	11.33
38.40	22.92	23.50	951.80	33,840	11.58
38.81	23.42	23.75	966.62	34,200	11.83
39.22	23.91	24 00	987.15	34,560	12.08

DIAMETER ONE-HALF INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 100 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
39.62	24.40	24.25	1,007.38	34,920	12.32
40.03	24.91	24.50	1,028.34	35,280	12.58
40.44	25.42	24.75	1,049.51	35,640	12.84
40.85	25.94	25.00	1,070.90	36,000	13.10
41.26	26.47	25.25	1,092.51	36,360	13.37
41.67	26.99	25.50	1,107.85	36,720	13.63
42.08	27.53	25.75	1,129.76	37,080	13.90
42.48	28.05	26.00	1,151.34	37,440	14.17
42.89	28.60	26.25	1,166.81	37,800	14.44
43.30	29.15	26.50	1,189.22	38,160	14.72
43.71	29.70	26.75	1,211.85	38,520	15.00
44.12	30.26	27.00	1,234.69	38,880	15.28
44.53	30.83	27.25	1,250.35	39,240	15.57
44.93	31.38	27.50	1,272.91	39,600	15.85
45.34	31.96	27.75	1,296.25	39,960	16.14
45.75	32.54	28.00	1,319.80	40,320	16.43
46.16	33.13	28.25	1,343.56	40,680	16.73
46.57	33.72	28.50	1,359.44	41,040	17.03
46.98	34.31	28.75	1,383.48	41,400	17.33
47.39	34.91	29.00	1,407.74	41,760	17.63
47.79	35.51	29.25	1,431.60	42,120	17.93
48.20	36.12	29.50	1,456.27	42,480	18.24
48.61	36.73	29.75	1,481.15	42,840	18.55
49.02	37.36	30.00	1,506.24	43,200	18.87

DIAMETER ONE-HALF INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 100 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
49.43	37.98	30.25	1,531.54	43,560	19.18
49.84	38.62	30.50	1,547.78	43,920	19.50
50.25	39.26	30.75	1,573.35	44,280	19.82

DIAMETER FIVE-EIGHTH INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 100 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
0.42	0.00	0.40	0.31	576	0.00
0.84	0.01	0.80	0.94	1,152	0.01
1.25	0.02	1.20	1.80	1,728	0.01
1.67	0.04	1.60	2.90	2,304	0.02
2.09	0.07	2.00	4.26	2,880	0.03
2.51	0.10	2.40	5.75	3,456	0.05
2.93	0.13	2.80	7.43	4,032	0.07
3.35	0.17	3.20	9.51	4,608	0.09
3.76	0.22	3.60	11.48	5,184	0.11
4.18	0.27	4.00	13.72	5,760	0.14
4.60	0.33	4.40	16.42	6,336	0.17
5.02	0.39	4.80	19.03	6,912	1.20
5.44	0.46	5.20	21.73	7,488	0.23
5.86	0.53	5.60	25.01	8,064	0.27
6.27	0.61	6.00	28.05	8,640	0.31
6.69	0.70	6.40	31.39	9,216	0.35
7.11	0.79	6.80	35.16	9,792	0.40
7.53	0.88	7.20	38.76	10,368	0.45
7.95	0.98	7.60	42.64	10,944	0.50
8.37	1.09	8.00	47.05	11,520	0.55
8.78	1.20	8.40	51.08	12,096	0.61
9.20	1.32	8.80	55.33	12,672	0.66
9.62	1.44	9.20	60.22	13,248	0.73
10.04	1.57	9.60	64.99	13,824	0.79

DIAMETER FIVE-EIGHTH INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 100 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
10.46	1.70	10.00	69.89	14,400	0.86
10.88	1.84	10.40	74.91	14,976	0.93
11.29	1.98	10.80	79.90	15,552	1.00
11.71	2.13	11.20	85.95	16,128	1.08
12.13	2.29	11.60	91,35	16,704	1.16
12.55	2.45	12.00	96.85	17,280	1.24
12.97	2.62	12.40	102.93	17,856	1.32
13.39	2.79	12.80	108.64	18,432	1.41
13.80	2.96	13.20	114.83	19,008	1.50
14.22	3.14	13.60	121.92	19,584	1.59
14.64	3.33	14.00	127.95	20,160	1.68
15.06	3.53	14.40	135.40	20,736	1.78
15.48	3.73	14.80	141.62	21,312	1.88
15.90	3.93	15.20	148.66	21,888	1.98
16.31	4.14	15.60	155.63	22,464	2.09
16.73	4.35	16.00	163.75	23,040	2.20
17.15	4.57	16.40	171.20	23,616	2.31
17.57	4.80	16.80	178.76	24,192	2.42
17.99	5.03	17.20	186.44	24,768	2.54
18.41	5.27	17.60	194.24	25,344	2.66
18.82	5.51	18.00	201.93	25,920	2.78
19.24	5.75	18.40	211.04	26,496	2.91
19.66	6.01	18.80	219.20	27,072	3.03
20.08	6.27	19.20	227.47	27,648	3.17

DIAMETER FIVE-EIGHTH INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 100 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
20.50	6.53	19.60	237.08	28,224	3.30
20.92	6.80	20.00	245.59	28,800	3.44
21.33	7.07	20.40	255.31	29,376	3.57
21.75	7.35	20.80	262.64	29,952	3.71
22.17	7.64	21.20	272.88	30,528	3.86
22.59	7.93	21.60	281.79	31,104	4.01
23.01	8.23	22.00	292.37	31,680	4.16
23.42	8.53	22.40	302.88	32,256	4.31
23.84	8.84	22.80	312.15	32,832	4.46
24.26	9.15	23.20	323.24	33,408	4.62
24.68	9.47	23.60	332.71	33,984	4.78
25.10	9.79	24.00	344.13	34,560	4.95
25.52	10.12	24.40	353.80	35,136	5.11
25.93	10.45	24.80	365.26	35,712	5.28
26.35	10.79	25.20	377.19	36,288	5.45
26.77	11.14	25.60	385.03	36,864	5.63
27.19	11.49	26.00	397.21	37,440	5.80
27.61	11.85	26.40	409.57	38,016	5.98
28.03	12.21	26.80	422.13	38,592	6.17
28.44	12.57	27.20	434.57	39,168	6.35
28.86	12.95	27.60	445.01	39,744	6.54
29.28	13.33	28.00	458.06	40,320	6.73
29.80	13.81	28.40	471.82	40,896	6.97
30.12	14.10	28.80	482.01	41,472	7.12

DIAMETER FIVE-EIGHTH INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 100 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
30.54	14.50	29.20	492.76	42,048	7.32
30.95	14.89	29.60	506.08	42,624	7.52
31.37	15.30	30.00	519.91	43,200	7.73
31.79	15.71	30.40	530.91	43,776	7.93
32.21	16.13	30.80	545.03	44,352	8.15
32.63	16.55	31.20	559.34	44,928	8.36
33.05	16.98	31.60	573.83	45,504	8.58
33.46	17.41	32.00	588.16	46,080	8.79
33.88	17.84	32.40	599.59	46,656	9.01
34.30	18.29	32.80	614.55	47,232	9.24
34.72	18.74	33.20	626.09	47,808	9.46
35.14	19.20	33.60	641.33	48,384	9.69
35.56	19.66	34.00	656.75	48,960	9.93
35.97	20.11	34.40	671.98	49,536	10.16
36.39	20.59	34.80	687.77	50,112	10.40
36.81	21.06	35.20	699.69	50,688	10.64
37.23	21.55	35.60	715.75	51,264	10.88
37.65	22.04	36.00	727.76	51,840	11.13
38.07	22.53	36.40	744.08	52,416	11.38
38.48	23.02	36.80	760.20	52,992	11.62
38.90	23.52	37.20	776.88	53,568	11.88
39.32	24.04	37.60	793.75	54,144	12.14
39.74	24.55	38.00	806.08	54,720	12.40
40.16	25.07	38.40	823.21	55,296	12.66

DIAMETER FIVE-EIGHTH INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 100 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
40.58	25.60	38.80	835.61	55,872	12.93
40.99	26.12	39.20	852.58	56,448	13.19
41.41	26.66	39.60	870.14	57,024	13.46
41.83	27.20	40.00	887.88	57,600	13.74
42.25	27.75	40.40	905.80	58,176	14.01
42.67	28.31	40.80	918.46	58,752	14.29
43.09	28.87	41.20	936.63	59,328	14 58
43.50	29.42	41.60	954.54	59,904	14.86
43.92	29.99	42.00	973.06	60,480	15.14
44.34	30.56	42.40	991.76	61,056	15.44
44.76	31.15	42.80	1,004.66	61,632	15.73
45.18	31.73	43.20	1,023.60	62,208	16.03
45.59	32.31	43.60	1,042.26	62,784	16.32
46.01	32.91	44.00	1,061.55	63,360	16.62
46.43	33.51	44.40	1,081.02	63,936	16.92
46.85	34.12	44.80	1,100.67	64,512	17.23
47.27	34.74	45.20	1,120 49	65,088	17.54
47.69	35.36	45.60	1,133.70	65,664	17.86
48.10	35.97	46.00	1,153.28	66,240	18.16
48.52	36.60	46.40	1,166.48	66,816	18.48
48.94	37.24	46.80	1,186.76	67,392	18.80
49.36	37.88	47.20	1,207.22	67,968	19.13
49.78	38.52	47.60	1,227.85	68,544	19.45
50.20	39.18	48.00	1,248.66	69,120	19.78

DIAMETER THREE-FOURTH INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 100 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
0.36	0.00	0.50	0.18	720	0.00
0.73	0.01	1.00	0.61	1,440	0.00
1.09	0.02	1.50	1.19	2,160	0.01
1.45	0.03	2.00	1.90	2,880	0.02
1.82	0.05	2.50	2.80	3,600	0.03
2.18	0.07	3.00	3.66	4,320	0.04
2.54	0.10	3.50	4.81	5,040	0.05
2.90	0.13	4.00	5.98	5,760	0.07
3.27	0.17	4.50	7.45	6,480	0.08
3.63	0.20	5.00	8.78	7,200	0.10
3.99	0.25	5.50	10.49	7,920	0.12
4.36	0.30	6.00	12.29	8,640	0.15
4.72	0.35	6.50	14.02	9,360	0.17
5.08	0.40	7.00	16.05	10,080	0.20
5.45	0.46	7.50	18.03	10,800	0.23
5.81	0.52	8.00	20.24	11,520	0.27
6.17	0.59	8.50	22.44	12,240	0.30
6.54	0.66	9.00	25.00	12,960	0.34
6.90	0.74	9.50	27.24	13,680	0.37
7.26	0.82	10.00	30.02	14,400	0.41
7.63	0.91	10.50	32.73	15,120	0.46
7.99	0.99	11.00	35.57	15,840	0.50
8.35	1.08	11.50	38.50	16,560	0.55
8.71	1.18	12.00	41.52	17,280	0.60

DIAMETER THREE-FOURTH INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 100 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
9.08	1.28	12.50	44.71	18,000	0.65
9.44	1.39	13.00	47.88	18,720	0.70
9.80	1.49	13.50	51.36	19,440	0.75
10.17	1.61	14.00	55.06	20,160	0.81
10.53	1.72	14.50	58.19	20,880	0.87
10.89	1.84	15.00	61.95	21,600	0.93
11.26	1.97	15.50	65.60	22,320	1.00
11.62	2.10	16.00	69.86	23,040	1.06
11.98	2.23	16.50	73.54	23,760	1.13
12.35	2.37	17.00	77.39	24,480	1.20
12.71	2.51	17.50	81.97	25,200	1.27
13.07	2.66	18.00	86.26	25,920	1.34
13.44	2.81	18.50	90.31	26,640	1.42
13.80	2.96	19.00	94.74	27,360	1.50
14.16	3.12	19.50	99.75	28,080	1.57
14.52	3.28	20.00	104.36	28,800	1.66
14.89	3.45	20.50	109.19	29,520	1.74
15.25	3.62	21.00	114.54	30,240	1.83
15.61	3.79	21.50	118.80	30,960	1.91
15.98	3.97	22.00	123.86	31,680	2.00
16.34	4.15	22.50	128.84	32,400	2.10
16.70	4.34	23.00	134.58	33,120	2.19
17.07	4.53	23.50	140.61	33,840	2.29
17.43	4.72	24.00	145.09	34,560	2.39

DIAMETER THREE-FOURTH INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 100 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of influx.
17.79	4.92	24.50	151.15	35,280	2.48
18.16	5.13	25.00	157.50	36,000	2.59
18.52	5.33	25.50	162.10	36,720	2.69
18.88	5.54	26.00	168.46	37,440	2.80
19.24	5.75	26.50	174.95	38,160	2.91
19.61	5 98	27.00	180.79	38,880	3.02
19.97	6.20	27.50	186.49	39,600	3.13
20.33	6.43	28.00	193.28	40,320	3.24
20.70	6.66	28.50	198.24	41,040	3.36
21.06	6.90	29.00	205.20	41,760	3.48
21.42	7.13	29.50	212.27	42,480	3.60
21.79	7.38	30.00	218.49	43,200	3.73
22.15	7.63	30.50	225.77	43,920	3.85
22.51	7.88	31.00	231.91	44,640	3.98
22.88	8.14	31.50	239.59	45,360	4.11
23.24	8.40	32.00	247.19	46,080	4.24
23.60	8.66	32.50	252.14	46,800	4.37
23.97	8.93	33.00	260.11	47,520	4.51
24.33	9.20	33.50	267.98	48,240	4.65
24.69	9.48	34.00	275.97	48,960	4.79
25.05	9.76	34.50	284.08	49,680	4.93
25.42	10.05	35.00	292.53	50,400	5.07
25.78	10.33	35.50	297.57	51,120	5.22
26.14	10.62	36.00	305.94	51,840	5.36

DIAMETER THREE-FOURTH INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 100 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
26.51	10.93	36.50	312.91	52,560	5.52
26.87	11.22	37.00	321.47	53,280	5.67
27.23	11.53	37.50	330.14	54,000	5.82
27.60	11.84	38.00	337.28	54,720	5.98
27.96	12.15	38.50	346.13	55,440	6.14
28.32	12.47	39.00	355.10	56,160	6.30
28.69	12.80	39.50	364.44	56,880	6.46
29.05	13.12	40.00	373.65	57,600	6.63
29.41	13.45	40.50	382.96	58,320	6.79
29.78	13.79	41.00	390.45	59,040	6.96
30.14	14.12	41.50	399.95	59,760	7.13
30.50	14.46	42.00	409.56	60,480	7.30
30.86	14.81	42.50	416.92	61,200	7.48
31.23	15.16	43.00	426.98	61,920	7.66
31.59	15.51	43.50	434.40	62,640	7.83
31.95	15.87	44.00	444.35	63,360	8.01
32.32	16.24	44.50	454.70	64,080	8.20
32.68	16.60	45.00	462.23	64,800	8.38
33.04	16.97	45.50	472.47	65,520	8.57
33.41	17.35	46.00	483.11	66,240	8.76
33.77	17.73	46.50	493.58	66,960	8.95
34.13	18.11	47.00	504.16	67,680	9.15
34.50	18.50	47.50	515.15	68,400	9.34
34.86	18.89	48.00	522.93	69,120	9.54

DIAMETER THREE-FOURTH INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 100 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
35.22	19.28	48.50	533.79	69,840	9.74
35.58	19.68	49.00	541.61	70,560	9.94
35.95	20.09	49.50	552.93	71,280	10.15
36.31	20.50	50.00	564.06	72,000	10.35
36.67	20.90	50.50	575.30	72,720	10.56
37.04	21.33	51.00	586.97	73,440	10.77
37.40	21.75	51.50	598.44	74,160	10.98
37.76	22.17	52.00	606.47	74,880	11.19
38.13	22.60	52.50	618.41	75,600	11.41
38.49	23.03	53.00	630.14	76,320	11.63
38.85	23.46	53.50	641.99	77,040	11.85
39.22	23.91	54.00	654.27	77,760	12.08
39.58	24.35	54.50	662.44	78,480	12.30
39.94	24.80	55.00	674.55	79,200	12.52
40.31	25.26	55.50	687.10	79,920	12.76
40.67	25.71	56.00	699.43	80,640	12.99
41.03	26.17	56.50	711.87	81,360	13.22
41.39	26.63	57.00	724.41	82,080	13.45
41.76	27.11	57.50	733.09	82,800	13.69
42.12	27.58	58.00	745.78	83,520	13.93
42.48	28.05	58.50	758.59	84,240	14.17
42.85	28.54	59.00	767.29	84,960	14.42
43.21	29.03	59.50	780.23	85,680	14.66
43.57	29.51	60.00	793.29	86,400	14.90

DIAMETER THREE-FOURTH INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 100 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
43.94	30.02	60.50	806.82	87,120	15.16
44.30	30.51	61.00	820.09	87,840	15.41
44.66	31.01	61.50	828.52	88,560	15.66
45.03	31.52	62.00	842.30	89,280	15.92
45.39	32.03	62.50	855.82	90,000	16.17
45.75	32.54	63.00	869.45	90,720	16.43
46.11	33.05	63.50	883.19	91,440	16.69
46.48	33.59	64.00	897.42	92,160	16.96
46.84	34.11	64.50	905.92	92,880	17.22
47.20	34.63	65.00	919.90	93,600	17.49
47.57	35.18	65.50	934.37	94,320	17.77
47.93	35.71	66.00	948.57	95,040	18.04
48.29	36.25	66.50	962.87	95,760	18.31
48.66	36.81	67.00	977.69	96,480	18.59
49.02	37.36	67.50	992.20	97,200	18.87
49.38	37.91	68.00	1,006.83	97,920	19.14
49.75	38.48	68.50	1,015.82	98,640	19.43
50.11	39.04	69.00	1,030.57	99,360	19.71

DIAMETER ONE INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 100 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
0.41	0.00	1.00	0.17	1,440	0.00
0.82	0.01	2.00	0.53	2,880	0.01
1.23	0.02	3.00	1.04	4,320	0.01
1.63	0.04	4.00	1.65	5,760	0.02
2.04	0.06	5.00	2.43	7,200	0.03
2.45	0.09	6.00	3.29	8,640	0.05
2.86	0.13	7.00	4.38	10,080	0.06
3.27	0.17	8.00	5.45	11,520	0.08
3.68	0.21	9.00	6.64	12,960	0.11
4.08	0.26	10.00	8.04	14,400	0.13
4.49	0.31	11.00	9.44	15,840	0.16
4.90	0.37	12.00	10.93	17,280	0.19
5.31	0.44	13.00	12.73	18,720	0.22
5.72	0.51	14.00	14.47	20,160	0.26
6.13	0.58	15.00	16.26	21,600	0.30
6.54	0.66	16.00	18.35	23,040	0.34
6.94	0.75	17.00	20.31	24,480	0.38
7.35	0.84	18.00	22.68	25,920	0.42
7.76	0.94	19.00	24.83	27,360	0.47
8.17	1.04	20.00	27.15	28,800	0.52
8.58	1.14	21.00	29.66	30,240	0.58
8.99	1.26	22.00	32.27	31,680	0.63
9.40	1.37	23.00	34.95	33,120	0.69
9.80	1.49	24.00	37.80	34,560	0.75

DIAMETER ONE INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 100 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
10.21	1.62	25.00	40.84	36,000	0.82
10.62	1.75	26.00	43.76	37,440	0.89
11.03	1.89	27.00	46.75	38,880	0.96
11.44	2.03	28.00	49.81	40,320	1.03
11.85	2.18	29.00	53.18	41,760	1.10
12.25	2.33	30.00	56.83	43,200	1.18
12.66	2.49	31.00	60.10	44,640	1.26
13.07	2.66	32.00	63.74	46,080	1.34
13.48	2.82	33.00	67.12	47,520	1.43
13.89	3.00	34.00	70.91	48,960	1.51
14.30	3.18	35.00	74.77	50,400	1.61
14.71	3.36	36.00	79.12	51,840	1.70
15.11	3.55	37.00	83.06	53,280	1.79
15.52	3.74	38.00	86.73	54,720	1.89
15.93	3.95	39.00	90.90	56,160	1.99
16.34	4.15	40.00	95.14	57,600	2.10
16.75	4.36	41.00	99.97	59,040	2.20
17.16	4.58	42.00	104.37	60,480	2.31
17.57	4.80	43.00	108.85	61,920	2.42
17.97	5.02	44.00	113.26	63,360	2.54
18.38	5.25	45.00	118.48	64,800	2.65
18.79	5.49	46.00	123.17	66,240	2.77
19.20	5.73	47.00	128.60	67,680	2.89
19.61	5.98	48.00	133.44	69,120	3.02

DIAMETER ONE INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 100 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
20.02	6.23	49.00	138.33	70,560	3.15
20.42	6.48	50.00	143.91	72,000	3.27
20.83	6.75	51.00	148.94	73,440	3.41
21.24	7.01	52.00	154.86	74,880	3.54
21.65	7.29	53.00	160.02	76,320	3.68
22.06	7.57	54.00	166.14	77,760	3.82
22.47	7.85	55.00	172.37	79,200	3.96
22.88	8.14	56.00	176.77	80,640	4.11
23.28	8.43	57.00	183.00	82,080	4.25
23.69	8.72	58.00	188.46	83,520	4.41
24.10	9.03	59.00	195.04	84,960	4.56
24.51	9.34	60.00	200.61	86,400	4.72
24.92	9.65	61.00	207.38	87,840	4.88
25.33	9.97	62.00	214.26	89,280	5.04
25.74	10.30	63.00	220.01	90,720	5.20
26.14	10.62	64.00	226.90	92,160	5.36
26.55	10.96	65.00	232.76	93,600	5.53
26.96	11.30	66.00	240.01	95,040	5.71
27.37	11.65	67.00	247.36	96,480	5.88
27.78	12.00	68.00	253.39	97,920	6.06
28.19	12.35	69.00	260.92	99,360	6.24
28.59	12.71	70.00	266.85	100,800	6.42
29.00	13.07	71.00	274.56	102,240	6.60
29.41	13.45	72.00	282.38	103,680	6.79

DIAMETER ONE INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 100 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
29.82	13.82	73.00	288.65	105,120	6.98
30.23	14.21	74.00	296.64	106,560	7.17
30.64	14.60	75.00	302.99	108,000	7.37
31.05	14.99	76.00	311.16	109,440	7.57
31.45	15.38	77.00	319.22	110,880	7.77
31.86	15.78	78.00	327.60	112,320	7.97
32.27	16.19	79.00	336.09	113,760	8.18
32.68	16.60	80.00	342.69	115,200	8.38
33.09	17.02	81.00	351.34	116,640	8.60
33.50	17.45	82.00	360.10	118,080	8.81
33.91	17.88	83.00	366.83	119,520	9.03
34.31	18.30	84.00	375.53	120,960	9.24
34.72	18.74	85.00	384.56	122,400	9.46
35.13	19.19	86.00	393.70	123,840	9.69
35.54	19.64	87.00	400.58	125,280	9.92
35.95	20.09	88.00	409.88	126,720	10.15
36.36	20.55	89.00	419.28	128,160	10.38
36.76	21.01	90.00	428.56	129,600	10.61
37.17	21.48	91.00	438.17	131,040	10.85
37.58	21.96	92.00	445.26	132,480	11.09
37.99	22.44	93.00	455.02	133,920	11.33
38.40	22.92	94.00	464.90	135,360	11.58
38.81	23.42	95.00	474.88	136,800	11.83
39.22	23.91	96.00	484.97	138,240	12.08

DIAMETER ONE INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 100 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
39.62	24.40	97.00	491.98	139,680	12.32
40.03	24.91	98.00	502.21	141,120	12.58
40.44	25.42	99.00	512.55	142,560	12.84
40.85	25.94	100.00	523.00	144,000	13.10
41.26	26.47	101.00	533.55	145,440	13.37
41.67	26.99	102.00	540.97	146,880	13.63
42.08	27.53	103.00	551.67	148,320	13.90
42.48	28.05	104.00	562.20	149,760	14.17
42.89	28.60	105.00	573.11	151,200	14.44
43.30	29.15	106.00	584.12	152,640	14.72
43.71	29.70	107.00	591.67	154,080	15.00
44.12	30.26	108.00	602.82	155,520	15.28
44.53	30.83	109.00	614.08	156,960	15.57
44.93	31.38	110.00	625.16	158,400	15.85
45.34	31.96	111.00	636.62	159,840	16.14
45.75	32.54	112.00	644.28	161,280	16.47
46.16	33.13	113.00	655.88	162,720	16.73
46.57	33.72	114.00	667.58	164,160	17.03
46.98	34.31	115.00	679.39	165,600	17.33
47.39	34.91	116.00	691.30	167,040	17.63
47.79	35.51	117.00	698.76	168,480	17.93
48.20	36.12	118.00	710.80	169,920	18.24
48.61	36.73	119.00	722.94	171,360	18.55
49.02	37.36	120.00	735.19	172,800	18.87

DIAMETER ONE INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 100 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
49.43	37.98	121.00	747.54	174,240	19.18
49.84	38.62	122.00	759.99	175,680	19.50
50.25	39.26	123.00	772.55	177,120	19.82

DIAMETER ONE AND ONE-FOURTH INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 100 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
0.39	0.00	1.50	0.12	2,160	0.00
0.78	0.01	3.00	0.37	4,320	0.00
1.18	0.02	4.50	0.74	6,480	0.01
1.57	0.04	6.00	1.19	8,640	0.02
1.96	0.06	7.50	1.75	10,800	0.03
2.35	0.09	9.00	2.41	12,960	0.04
2.75	0.12	10.50	3.14	15,120	0.06
3.14	0.15	12.00	3.91	17,280	0.08
3.53	0.19	13.50	4.84	19,440	0.10
3.92	0.24	15.00	5.78	21,600	0.12
4.31	0.29	16.50	6.88	23,760	0.15
4.71	0.34	18.00	7.98	25,920	0.17
5.10	0.40	19.50	9.24	28,080	0.20
5.49	0.47	21.00	10.53	30,240	0.24
5.88	0.54	22.50	11.82	32,400	0.27
6.27	0.61	24.00	13.32	34,560	0.31
6.67	0.69	25.50	14.81	36,720	0.35
7.06	0.77	27.00	16.44	38,880	0.39
7.45	0.86	28.50	18.06	41,040	0.44
7.84	0.96	30.00	19.91	43,200	0.48
8.24	1.06	31.50	21.69	45,360	0.53
8.63	1.16	33.00	23.45	47,520	0.58
9.02	1.26	34.50	25.50	49,680	0.64
9.41	1.38	36.00	27.49	51,840	0.70

DIAMETER ONE AND ONE-FOURTH INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 100 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
9.80	1.49	37.50	29.67	54,000	0.75
10.20	1.62	39.00	31.99	56,160	0.82
10.59	1.74	40.50	34.14	58,320	0.88
10.98	1.87	42.00	36.35	60,480	0.95
11.37	2.01	43.50	38.78	62,640	1.01
11.76	2.15	45.00	41.07	64,800	1.09
12.16	2.30	46.50	43.92	66,960	1.16
12.55	2.45	48.00	46.54	69,120	1.24
12.94	2.60	49.50	48.98	71,280	1.31
13.33	2.76	51.00	51.71	73,440	1.40
13.73	2.93	52.50	54.86	75,600	1.48
14.12	3.10	54.00	57.73	77,760	1.57
14.51	3.27	55.50	60.33	79,920	1.65
14.90	3.45	57.00	63.29	82,080	1.74
15.29	3.63	58.50	66.29	84,240	1.84
15.69	3.83	60.00	69.81	86,400	1.93
16.08	4.02	61.50	72.93	88,560	2.03
16.47	4.22	63.00	76.11	90,720	2.13
16.86	4.42	64.50	79.33	92,880	2.23
17.25	4.63	66.00	83.05	95,040	2.34
17.65	4.84	67.50	86.48	97,200	2.45
18.04	5.06	69.00	90.34	99,360	2.56
18.43	5.28	70.50	93.78	101,520	2.67
18.82	5.51	72.00	97.26	103,680	2.78

DIAMETER ONE AND ONE-FOURTH INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 100 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
19.22	5.74	73.50	101.44	105,840	2.90
19.61	5.98	75.00	105.03	108,000	3.02
20.00	6.22	76.50	108.65	110,160	3.14
20.39	6.46	78.00	112.93	112,320	3.26
20.78	6.71	79.50	116.65	114,480	3.39
21.18	6.97	81.00	121.18	116,640	3.52
21.57	7.23	82.50	124.99	118,800	3.65
21.96	7.50	84.00	129.55	120,960	3.79
22.35	7.77	85.50	134.19	123,120	3.92
22.75	8.05	87.00	137.49	125,280	4.06
23.14	8.32	88.50	142.25	127,440	4.20
23.53	8.61	90.00	146.26	129,600	4.35
23.92	8.90	91.50	151.14	131,760	4.49
24.31	9.19	93.00	156.11	133,920	4.64
24.71	9.49	94.50	161.29	136,080	4.79
25.10	9.79	96.00	166.43	138,240	4.95
25.49	10.10	97.50	171.64	140,400	5.10
25.88	10.41	99.00	175.93	142,560	5.26
26.27	10.73	100.50	181.27	144,720	5.42
26.67	11.06	102.00	185.77	146,880	5.58
27.06	11.38	103.50	191.25	149,040	5.75
27.45	11.71	105.00	196.80	151,200	5.92
27.84	12.05	106.50	201.27	153,360	6.08
28.24	12.40	108.00	207.10	155,520	6.26

DIAMETER ONE AND ONE-FOURTH INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 100 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
28.63	12.74	109.50	211.63	157,680	6.44
29.02	13.09	111.00	217.44	159,840	6.61
29.41	13.45	112.50	223.32	162,000	6.79
29.80	13.81	114.00	227.96	164,160	6.97
30.20	14.18	115.50	234.12	166,320	7.16
30.59	14.55	117.00	240.21	168,480	7.35
30.98	14.92	118.50	246.37	170,640	7.53
31.37	15.30	120.00	252.61	172,800	7.73
31.76	15.68	121.50	257.43	174,960	7.92
32.16	16.08	123.00	263.95	177,120	8.12
32.55	16.47	124.50	268.81	179,280	8.32
32.94	16.87	126.00	275.29	181,440	8.52
33.33	17.27	127.50	281.85	183,600	8.72
33.73	17.69	129.00	288.65	185,760	8.93
34.12	18.10	130.50	295.37	187,920	9.14
34.51	18.51	132.00	300.38	190,080	9.35
34.90	18.94	133.50	307.21	192,240	9.56
35.29	19.36	135.00	314.12	194,400	9.78
35.69	19.80	136.50	319.38	196,560	10.00
36.08	20.24	138.00	326.39	198,720	10.22
36.47	20.68	139.50	333.49	200,880	10.44
36.86	21.12	141.00	340.66	203,040	10.67
37.25	21.57	142.50	347.90	205,200	10.89
37.65	22.04	144.00	353.30	207,360	11.13

DIAMETER ONE AND ONE-FOURTH INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 100 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
38.04	22.50	145.50	360.66	209,520	11.36
38.43	22.96	147.00	368.09	211,680	11.59
38.82	23.43	148.50	373.35	213,840	11.83
39.22	23.91	150.00	381.09	216,000	12.08
39.61	24.39	151.50	388.70	218,160	12.32
40.00	24.87	153.00	396.39	220,320	12.56
40.39	25.36	154.50	404.16	222,480	12.81
40.78	25.85	156.00	409.52	224,640	13.06
41.18	26.36	157.50	417.59	226,800	13.31
41.57	26.87	159.00	425.54	228,960	13.57
41.96	27.37	160.50	433.56	231,120	13.82
42.35	27.88	162.00	441.66	233,280	14.08
42.75	28.41	163.50	447.32	235,440	14.35
43.14	28.93	165.00	455.51	237,600	14.61
43.53	29.46	166.50	463.79	239,760	14.88
43.92	29.99	168.00	472.13	241,920	15.14
44.31	30.52	169.50	480.56	244,080	15.41
44.71	31.08	171.00	489.27	246,240	15.69
45.10	31.62	172.50	497.85	248,400	15.97
45.49	32.17	174.00	506.49	250,560	16.25
45.88	32.72	175.50	512.07	252,720	16.53
46.27	33.28	177.00	520.82	254,880	16.81
46.67	33.86	178.50	529.86	257,040	17.10
47.06	34.43	180.00	538.75	259.200	17.39

DIAMETER ONE AND ONE-FOURTH INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 100 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
47.45	35.00	181.50	547.72	261,360	17.68
47.84	35.58	183.00	553.34	263,520	17.97
48.24	36.18	184.50	562.64	265,680	18.27
48.63	36.77	186.00	571.77	267,840	18.57
49.02	37.36	187.50	580.98	270,000	18.87
49.41	37.95	189.00	590.26	272,160	19.17
49.80	38.56	190.50	599.61	274,320	19.47
50.20	39.18	192.00	609.29	276,480	19.78

DIAMETER ONE AND ONE-HALF INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 100 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
0.36	0.00	2.00	0.08	2,880	0.00
0.73	0.01	4.00	0.27	5,760	0.00
1.09	0.02	6.00	0.54	8,640	0.01
1.45	0.03	8.00	0.85	11,520	0.02
1.82	0.05	10.00	1.24	14,400	0.03
2.18	0.07	12.00	1.69	17,280	0.04
2.54	0.10	14.00	2.23	20,160	0.05
2.90	0.13	16.00	2.77	23,040	0.07
3.27	0.17	18.00	3.46	25,920	0.08
3.63	0.20	20.00	4.10	28,800	0.10
3.99	0.25	22.00	4.87	31,680	0.12
4.36	0.30	24.00	5.72	34,560	0.15
4.72	0.35	26.00	6.54	37,440	0.17
5.08	0.40	28.00	7.48	40,320	0.20
5.45	0.46	30.00	8.42	43,200	0.23
5.81	0.52	32.00	9.49	46,080	0.27
6.17	0.59	34.00	10.51	48,960	0.30
6.54	0.66	36.00	11.70	51,840	0.34
6.90	0.74	38.00	12.85	54,720	0.37
7.26	0.82	40.00	14.09	57,600	0.41
7.63	0.91	42.00	15.35	60,480	0.46
7.99	0.99	44.00	16.75	63,360	0.50
8.35	1.08	46.00	18.21	66,240	0.55
8.71	1.18	48.00	19.53	69,120	0.60

DIAMETER ONE AND ONE-HALF INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 100 Ft.	Discharge in U. S. Gallons. per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
9.08	1.28	50.00	21.12	72,000	0.65
9.44	1.39	52.00	22.61	74,880	0.70
9.80	1.49	54.00	24.25	77,760	0.75
10.17	1.61	56.00	25.98	80,640	0.81
10.53	1.72	58.00	27.58	83,520	0.87
10.89	1.84	60.00	29.20	86,400	0.93
11.26	1.97	62.00	31.06	89,280	1.00
11.62	2.10	64.00	33.08	92,160	1.06
11.98	2.23	66.00	34.81	95,040	1.13
12.35	2.37	68.00	36.80	97,920	1.20
12.71	2.51	70.00	38.98	100,800	1.27
13.07	2.66	72.00	41.00	103,680	1.34
13.43	2.80	74.00	42.85	106,560	1.42
13.80	2.96	76.00	45.00	109,440	1.50
14.16	3.12	78.00	47.38	112,320	1.57
14.52	3.28	80.00	49.56	115,200	1.66
14.89	3.45	82.00	51.84	118,080	1.74
15.25	3.62	84.00	54.38	120,960	1.83
15.61	3.79	86.00	56.67	123,840	1.91
15.98	3.97	88.00	59.07	126,720	2.00
16.34	4.15	90.00	61.43	129,600	2.10
16.70	4.34	92.00	64.17	132,480	2.19
17.07	4.53	94.00	66.68	135,360	2.29
17.43	4.72	96.00	69.52	138,240	2.39

DIAMETER ONE AND ONE-HALF INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 100 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
17.79	4.92	98.00	72.03	141,120	2.48
18.16	5.13	100.00	75.06	144,000	2.59
18.52	5.33	102.00	77.64	146,880	2.69
18.88	5.54	104.00	80.24	149,760	2.80
19.24	5.75	106.00	83.33	152,640	2.91
19.61	5.98	108.00	86.09	155,520	3.02
19.97	6.20	110.00	89.28	158,400	3.13
20.33	6.43	112.00	92.53	161,280	3.24
20.70	6.66	114.00	94.86	164,160	3.36
21.06	6.90	116.00	98.19	167,040	3.48
21.42	7.13	118.00	101.57	169,920	3.60
21.79	7.38	120.00	104.52	172,800	3.73
22.15	7.63	122.00	108.00	175,680	3.85
22.51	7.88	124.00	110.91	178,560	3.98
22.88	8.14	126.00	114.59	181,440	4.11
23.24	8.40	128.00	118.22	184,320	4.24
23.60	8.66	130.00	121.22	187,200	4.37
23.97	8.93	132.00	125.05	190,080	4.51
24.33	9.20	134.00	128.84	192,960	4.65
24.69	9.48	136.00	131.92	195,840	4.79
25.05	9.76	138.00	135.79	198,720	4.93
25.42	10.05	140.00	139.84	201,600	5.07
25.78	10.33	142.00	143.00	204,480	5.22
26.14	10.62	144.00	147.02	207,360	5.36

DIAMETER ONE AND ONE-HALF INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 100 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
26.51	10.93	146.00	150.34	210,240	5.52
26.87	11.22	148.00	154.45	213,120	5.67
27.23	11.53	150.00	158.61	216,000	5.82
27.60	11.84	152.00	162.95	218,880	5.98
27.96	12.15	154.00	167.23	221,760	6.14
28.32	12.47	156.00	171.57	224,640	6.30
28.69	12.80	158.00	175.06	227,520	6.46
29.05	13.12	160.00	179.48	230,400	6.63
29.41	13.45	162.00	183.95	233,280	6.79
29.77	13.78	164.00	187.38	236,160	6.96
30.14	14.12	166.00	192.07	239,040	7.13
30.50	14.46	168.00	196.68	241,920	7.30
30.86	14.81	170.00	200.17	244,800	7.48
31.23	15.16	172.00	205.00	247,680	7.66
31.59	15.51	174.00	208.51	250,560	7.83
31.95	15.87	176.00	213.29	253,440	8.01
32.32	16.24	178.00	218.26	256,320	8.20
32.68	16.60	180.00	223.15	259,200	8.38
33.04	16.97	182.00	228.09	262,080	8.57
33.41	17.35	184.00	233.23	264,960	8.76
33.77	17.73	186.00	236.86	267,840	8.95
34.13	18.11	188.00	241.94	270,720	9.15
34.50	18.50	190.00	247.21	273,600	9.34
34.86	18.89	192.00	252.40	276,480	9.54

DIAMETER ONE AND ONE-HALF INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 100 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
35.22	19.28	194.00	257.64	279,360	9.74
35.58	19.68	196.00	261.36	282,240	9.94
35.95	20.09	198.00	266.82	285,120	10.15
36.31	20.50	200.00	272.19	288,000	10.35
36.67	20.90	202.00	277.62	290,880	10.56
37.04	21.33	204.00	283.25	293,760	10.77
37.40	21.75	206.00	288.78	296,640	10.98
37.76	22.17	208.00	292.59	299,520	11.19
38.13	22.60	210.00	298.36	302,400	11.41
38.49	23.03	212.00	304.02	305,280	11.63
38.85	23.46	214.00	309.73	308,160	11.85
39.22	23.91	216.00	315.66	311,040	12.08
39.58	24.35	218.00	319.53	313,920	12.30
39.94	24.80	220.00	325.37	316,800	12.52
40.30	25.25	222.00	331.26	319,680	12.75
40.67	25.71	224.00	337.37	322,560	12.99
41.03	26.17	226.00	343.37	325,440	13.22
41.39	26.63	228.00	349.42	328,320	13.45
41.76	27.11	230.00	353.53	331,200	13.69
42.12	27.58	232.00	359.65	334,080	13.93
42.48	28.05	234.00	365.83	336,960	14.17
42.85	28.54	236.00	372.23	339,840	14.42
43.21	29.03	238.00	378.51	342,720	14.66
43.57	29.51	240.00	382.48	345,600	14.90

DIAMETER ONE AND ONE-HALF INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 100 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
43.94	30.02	242.00	389.00	348,480	15.16
44.30	30.51	244.00	395.40	351,360	15.41
44.66	31.01	246.00	401.86	354,240	15.66
45.03	31.52	248.00	408.54	357,120	15.92
45.39	32.03	250.00	415.10	360,000	16.17
45.75	32.54	252.00	421.71	362,880	16.43
46.11	33.05	254.00	428.37	365,760	16.69
46.48	33.59	256.00	435.28	368,640	16.96
46.84	34.11	258.00	439.32	371,520	17.22
47.20	34.63	260.00	446.10	374,400	17.49
47.57	35.18	262.00	453.12	377,280	17.77
47.93	35.71	264.00	460.00	380,160	18.04
48.29	36.25	266.00	466.94	383,040	18.31
48.66	36.81	268.00	471.17	385,920	18.59
49.02	37.36	270.00	478.17	388,800	18.87
49.38	37.91	272.00	485.22	391,680	19.14
49.75	38.48	274.00	492.52	394,560	19.43
50.11	39.04	276.00	499.67	397,440	19.71

DIAMETER TWO INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 100 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
0.41	0.00	4.00	0.07	5,760	0.00
0.82	0.01	8.00	0.23	11,520	0.01
1.23	0.02	12.00	0.45	17,280	0.01
1.63	0.04	16.00	0.72	23,040	0.02
2.04	0.06	20.00	1.08	28,800	0.03
2.45	0.09	24.00	1.47	34,560	0.05
2.86	0.13	28.00	1.96	40,320	0.06
3.27	0.17	32.00	2.45	46,080	0.08
3.68	0.21	36.00	2.99	51,840	0.11
4.08	0.26	40.00	3.63	57,600	0.13
4.49	0.31	44.00	4.27	63,360	0.16
4.90	0.37	48.00	4.97	69,120	0.19
5.31	0.44	52.00	5.79	74,880	0.22
5.72	0.51	56.00	6.59	80,640	0.26
6.13	0.58	60.00	7.43	86,400	0.30
6.54	0.66	64.00	8.38	92,160	0.34
6.94	0.75	68.00	9.30	97,920	0.38
7.35	0.84	72.00	10.38	103,680	0.42
7.76	0.94	76.00	11.40	109,440	0.47
8.17	1.04	80.00	12.45	115,200	0.52
8.58	1.14	84.00	13.73	120,960	0.58
8.99	1.26	88.00	14.93	126,720	0.63
9.40	1.37	92.00	16.15	132,480	0.69
9.80	1.49	96.00	17.47	138,240	0.75

DIAMETER TWO INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 100 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
10.21	1.62	100.00	18.86	144,000	0.82
10.62	1.75	104.00	20.20	149,760	0.89
11.03	1.89	108.00	21.68	155,520	0.96
11.44	2.03	112.00	23.07	161,280	1.03
11.85	2.18	116.00	24.62	167,040	1.10
12.25	2.33	120.00	26.32	172,800	1.18
12.66	2.49	124.00	27.96	178,560	1.26
13.07	2.66	128.00	29.64	184,320	1.34
13.48	2.82	132.00	31.36	190,080	1.43
13.89	3.00	136.00	33.11	195,840	1.51
14.30	3.18	140.00	34.91	201,600	1.61
14.71	3.36	144.00	36.94	207,360	1.70
15.11	3.55	148.00	38.76	213,120	1.79
15.52	3.74	152.00	40.67	218,880	1.89
15.93	3.95	156.00	42.61	224,640	1.99
16.34	4.15	160.00	44.58	230,400	2.10
16.75	4.36	164.00	46.84	236,160	2.20
17.16	4.58	168.00	48.89	241,920	2.31
17.57	4.80	172.00	51.26	247,680	2.42
17.97	5.02	176.00	53.31	253,440	2.54
18.38	5.25	180.00	55.46	259,200	2.65
18.79	5.49	184.00	57.63	264,960	2.77
19.20	5.73	188.00	60.18	270,720	2.89
19.61	5.98	192.00	62.77	276,480	3.02

DIAMETER TWO INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 100 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
20.02	6.23	196.00	65.05	282,240	3.15
20.42	6.48	200.00	67.68	288,000	3.27
20.83	6.75	204.00	70.02	293,760	3.41
21.24	7.01	208.00	72.80	299,520	3.54
21.65	7.29	212.00	75.20	305,280	3.68
22.06	7.57	216.00	78.08	311,040	3.82
22.47	7.85	220.00	81.01	316,800	3.96
22.88	8.14	224.00	83.50	322,560	4.11
23.28	8.43	228.00	86.45	328,320	4.25
23.69	8.72	232.00	88.99	334,080	4.41
24.10	9.03	236.00	92.10	339,840	4.56
24.51	9.34	240.00	94.70	345,600	4.72
24.92	9.65	244.00	97.90	351,360	4.88
25.33	9.97	248.00	101.14	357,120	5.04
25.74	10.30	252.00	103.83	362,880	5.20
26.14	10.62	256.00	107.08	368,640	5.36
26.55	10.96	260.00	109.81	374,400	5.53
26.96	11.30	264.00	113.22	380,160	5.71
27.37	11.65	268.00	116.69	385,920	5.88
27.78	12.00	272.00	119.50	391,680	6.06
28.19	12.35	276.00	123.05	397,440	6.24
28.59	12.71	280.00	126.57	403,200	6.42
29.00	13.07	284.00	130.22	408,960	6.60
29.41	13.45	288.00	133.93	414,720	6.79

DIAMETER TWO INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 100 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
29.82	13.82	292.00	136.86	420,480	6.98
30.23	14.21	296.00	140.65	426,240	7.17
30.64	14.60	300.00	144.49	432,000	7.37
31.05	14.99	304.00	148.38	437,760	7.57
31.45	15.38	308.00	152.23	443,520	7.77
31.86	15.78	312.00	155.28	449,280	7.97
32.27	16.19	316.00	159.30	455,040	8.18
32.68	16.60	320.00	163.38	460,800	8.38
33.09	17.02	324.00	167.50	466,560	8.60
33.50	17.45	328.00	171.68	472,320	8.81
33.91	17.88	332.00	174.83	478,080	9.03
34.31	18.30	336.00	178.98	483,840	9.24
34.72	18.74	340.00	182.16	489,600	9.46
35.13	19.19	344.00	186.49	495,360	9.69
35.54	19.64	348.00	190.87	501,120	9.92
35.95	20.09	352.00	195.30	506,880	10.15
36.36	20.55	356.00	199.78	512,640	10.38
36.76	21.01	360.00	204.20	518,400	10.61
37.17	21.48	364.00	208.78	524,160	10.85
37.58	21.96	368.00	212.09	529,920	11.09
37.99	22.44	372.00	216.74	535,680	11.33
38.40	22.92	376.00	221.45	541,440	11.58
38.81	23.42	380.00	226.20	547,200	11.83
39.22	23.91	384.00	231.00	551,960	12.08

DIAMETER TWO INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 100 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
39.62	24.40	388.00	234.28	558,720	12.32
40.03	24.91	392 00	239.15	564,480	12.58
40.44	25.42	396.00	244.07	570,240	12.84
40.85	25.94	400.00	249.05	576,000	13.10
41.26	26.47	404.00	254.07	581,760	13.37
41.67	26.99	408.00	259.15	587,520	13.63
42.08	27.53	412.00	264.27	593,280	13.90
42.48	28.05	416.00	269.32	599,040	14.17
42.89	28.60	420.00	272.83	604,800	14.44
43.30	29.15	424.00	278.07	610,560	14.72
43.71	29.70	428.00	283.36	616,320	15.00
44.12	30.26	432.00	288.70	622,080	15.28
44.53	30.83	436.00	292.24	627,840	15.57
44.93	31.38	440.00	297.51	633,600	15.85
45.34	31.96	444.00	302.97	639,360	16.14
45.75	32.54	448.00	308.47	645,120	16.43
46.16	33.13	452.00	314.03	650,880	16.73
46.57	33.72	456.00	319.63	656,640	17.03
46.98	34.31	460.00	325.28	662,400	17.33
47 39	34.91	464.00	330.99	668,160	17.63
47.79	35.51	468.00	334.47	673,920	17.93
48.20	36.12	472.00	340.23	679,680	18.24
48.61	36.73	476.00	346.04	685,440	18.55
49.02	37.36	480.00	351.90	691,200	18.87

DIAMETER TWO INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 100 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
49.43	37.98	484.00	357.82	696,960	19.18
49.84	38.62	488.00	361.46	702,720	19.50
50.25	39.26	492.00	367.43	708,480	19.82

DIAMETER TWO AND ONE-HALF INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 100 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
0.39	0.00	6.00	0.05	8,640	0.00
0.78	0.01	12.00	0.15	17,280	0.00
1.18	0.02	18.00	0.31	25,920	0.01
1.57	0.04	24.00	0.50	34,560	0.02
1.96	0.06	30.00	0.75	43,200	0.03
2.35	0.09	36.00	1.04	51,840	0.04
2.75	0.12	42.00	1.36	60,480	0.06
3.14	0.15	48.00	1.71	69,120	0.08
3.53	0.19	54.00	2.12	77,760	0.10
3.92	0.24	60.00	2.53	86,400	0.12
4.31	0.29	66.00	3.02	95,040	0.15
4.71	0.34	72.00	3.53	103,680	0.17
5.10	0.40	78.00	4.10	112,320	0.20
5.49	0.47	84.00	4.66	120,960	0.24
5.88	0.54	90.00	5.26	129,600	0.27
6.27	0.61	96.00	5.93	138,240	0.31
6.67	0.69	102.00	6.61	146,880	0.35
7.06	0.77	108.00	7.36	155,520	0.39
7.45	0.86	114.00	8.08	164,160	0.44
7.84	0.96	120.00	8.90	172,800	0.48
8.24	1.06	126.00	9.73	181,440	0.53
8.63	1.16	132.00	10.56	190,080	0.58
9.02	1.26	138.00	11.47	198,720	0.64
9.41	1.38	144.00	12.42	207,360	0.70

DIAMETER TWO AND ONE-HALF INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 100 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
9.80	1.49	150.00	13.40	216,000	0.75
10.20	1.62	156.00	14.44	224,640	0.82
10.59	1.74	162.00	15.48	233,280	0.88
10.98	1.87	168.00	16.55	241,920	0.95
11.37	2.01	174.00	17.56	250,560	1.01
11.76	2.15	180.00	18.68	259,200	1.09
12.16	2.30	186.00	19.97	267,840	1.16
12.55	2.45	192.00	21.16	276,480	1.24
12.94	2.60	198.00	22.37	285,120	1.31
13.33	2.76	204.00	23.60	293,760	1.40
13.73	2.93	210.00	25.04	302,400	1.48
14.12	3.10	216.00	26.33	311,040	1.57
14.51	3.27	222.00	27.65	319,680	1.65
14.90	3.45	228.00	28.99	328,320	1.74
15.29	3.63	234.00	30.36	336,960	1.84
15.69	3.83	240.00	31.96	345,600	1.93
16.08	4.02	246.00	33.57	354,240	2.03
16.47	4.22	252.00	35.02	362,880	2.13
16.86	4.42	258.00	36.48	371,520	2.23
17.25	4.63	264.00	38.19	380,160	2.34
17.65	4.84	270.00	39.75	388,800	2.45
18.04	5.06	276.00	41.53	397,440	2.56
18.43	5.28	282.00	43.09	406,080	2.67
18.82	5.51	288.00	44.67	414,720	2.78

DIAMETER TWO AND ONE-HALF INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 100 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
19.22	5.74	294.00	46.59	423,360	2.90
19.61	5.98	300.00	48.50	432,000	3.02
20.00	6.22	306.00	50.15	440,640	3.14
20.39	6.46	312.00	52.12	449,280	3.26
20.78	6.71	318.00	53.81	457,920	3.39
21.18	6.97	324.00	55.90	466,560	3.52
21.57	7.23	330.00	57.63	475,200	3.65
21.96	7.50	336.00	59.74	483,840	3.79
22.35	7.77	342.00	61.88	492,480	3.92
22.75	8.05	348.00	64.11	501,120	4.06
23.14	8.32	354.00	66.33	509,760	4.20
23.53	8.61	360.00	68.17	518,400	4.35
23.92	8.90	366.00	70.45	527,040	4.49
24.31	9.19	372.00	72.76	535,680	4.64
24.71	9.49	378.00	74.72	544,320	4.79
25.10	9.79	384.00	77.10	552,960	4.95
25.49	10.10	390.00	79.52	561,600	5.10
25.88	10.41	396.00	81.97	570,240	5.26
26.27	10.73	402.00	84.46	578,880	5.42
26.67	11.06	408.00	86.52	587,520	5.58
27.06	11.38	414.00	89.07	596,160	5.75
27.45	11.71	420.00	91.65	604,800	5.92
27.84	12.05	426.00	93.70	613,440	6.08
28.24	12.40	432.00	96.41	622,080	6.26

DIAMETER TWO AND ONE-HALF INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 100 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
28.63	12.74	438.00	99.09	630,720	6.44
29.02	13.09	444.00	101.81	639,360	6.61
29.41	13.45	450.00	104.56	648,000	6.79
29.80	13.81	456.00	106.69	656,640	6.97
30.20	14.18	462.00	109.57	665,280	7.16
30.59	14.55	468.00	111.72	673,920	7.35
30.98	14.92	474.00	114.59	682,560	7.53
31.37	15.30	480.00	117.49	691,200	7.73
31.76	15.68	486.00	120.43	699,840	7.92
32.16	16.08	492.00	123.49	708,480	8.12
32.55	16.47	498.00	125.71	717,120	8.32
32.94	16.87	504.00	128.74	725,760	8.52
33.33	17.27	510.00	131.81	734,400	8.72
33.73	17.69	516.00	134.99	743,040	8.93
34.12	18.10	522.00	138.13	751,680	9.14
34.51	18.51	528.00	140.42	760,320	9.35
34.90	18.94	534.00	143.61	768,960	9.56
35.29	19.36	540.00	146.83	777,600	9.78
35.69	19.80	546.00	150.18	786,240	10.00
36.08	20.24	552.00	153.48	794,880	10.22
36.47	20.68	558.00	156.82	803,520	10.44
36.86	21.12	564.00	160.19	812,160	10.67
37.25	21.57	570.00	163.60	820,800	10.89
37.65	22.04	576.00	166.07	829,440	11.13

DIAMETER TWO AND ONE-HALF INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 100 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
38.04	22.50	582.00	169.53	838,080	11.36
38.43	22.96	588.00	173.02	846,720	11.59
38.82	23.43	594.00	176.56	855,360	11.83
39.22	23.91	600.00	180.21	864,000	12.08
39.61	24.39	606.00	182.64	872,640	12.32
40.00	24.87	612.00	186.26	881,280	12.56
40.39	25.36	618.00	189.91	889,920	12.81
40.78	25.85	624.00	193.59	898,560	13.06
41.18	26.36	630.00	197.41	907,200	13.31
41.57	26.87	636.00	199.88	915,840	13.57
41.96	27.37	642.00	203.64	924,480	13.82
42.35	27.88	648.00	207.45	933,120	14.08
42.75	28.41	654.00	211.38	941,760	14.35
43.14	28.93	660.00	215.26	950,400	14.61
43.53	29.46	666.00	217.75	959,040	14.88
43.92	29.99	672.00	221.67	967,680	15.14
44.31	30.52	678.00	225.63	976,320	15.41
44.71	31.08	684.00	229.72	984,960	15.69
45.10	31.62	690.00	233.75	993,600	15.97
45.49	32.17	696.00	237.81	1,002,240	16.25
45.88	32.72	702.00	241.90	1,010,880	16.53
46.27	33.28	708.00	246.03	1,019,520	16.81
46.67	33.86	714.00	250.30	1,028,160	17.10
47.06	34.43	720.00	254.50	1,036,800	17.39

DIAMETER TWO AND ONE-HALF INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 100 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
47.45	35.00	726.00	258.74	1,045,440	17.68
47.84	35.58	732.00	261.30	1,054,080	17.97
48.24	36.18	738.00	265.69	1,062,720	18.27
48.63	36.77	744.00	270.00	1,071,360	18.57
49.02	37.36	750.00	274.35	1,080,000	18.87
49.41	37.95	756.00	278.73	1,088,640	19.17
49.80	38.56	762.00	283.15	1,097,280	19.47
50.20	39.18	768.00	287.72	1,105,920	19.78

DIAMETER THREE INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 100 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
0.36	0.00	8.00	0.03	11,520	0.00
0.73	0.01	16.00	0.11	23,040	0.00
1.09	0.02	24.00	0.21	34,560	0.01
1.45	0.03	32.00	0.34	46,080	0.02
1.82	0.05	40.00	0.51	57,600	0.03
2.18	0.07	48.00	0.70	69,120	0.04
2.54	0.10	56.00	0.93	80,640	0.05
2.90	0.13	64.00	1.16	92,160	0.07
3.27	0.17	72.00	1.45	103,680	0.08
3.63	0.20	80.00	1.73	115,200	0.10
3.99	0.25	88.00	2.07	126,720	0.12
4.36	0.30	96.00	2.44	138,240	0.15
4.72	0.35	104.00	2.80	149,760	0.17
5.08	0.40	112.00	3.21	161,280	0.20
5.45	0.46	120.00	3.62	172,800	0.23
5.81	0.52	128.00	4.09	184,320	0.27
6.17	0.59	136.00	4.55	195,840	0.30
6.54	0.66	144.00	5.05	207,360	0.34
6.90	0.74	152.00	5.57	218,880	0.37
7.26	0.82	160.00	6.13	230,400	0.41
7.63	0.91	168.00	6.70	241,920	0.46
7.99	0.99	176.00	7.30	253,440	0.50
8.35	1.08	184.00	7.93	264,960	0.55
8.71	1.18	192.00	8.59	276,480	0.60

DIAMETER THREE INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 100 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
9.08	1.28	200.00	9.28	288,000	0.65
9.44	1.39	208.00	9.97	299,520	0.70
9.80	1.49	216.00	10.69	311,040	0.75
10.17	1.61	224.00	11.45	322,560	0.81
10.53	1.72	232.00	12.20	334,080	0.87
10.89	1.84	240.00	12.98	345,600	0.93
11.26	1.97	248.00	13.72	357,120	1.00
11.62	2.10	256.00	14.61	368,640	1.06
11.98	2.23	264.00	15.53	380,160	1.13
12.35	2.37	272.00	16.41	391,680	1.20
12.71	2.51	280.00	17.38	403,200	1.27
13.07	2.66	288.00	18.27	414,720	1.34
13.43	2.80	296.00	19.18	426,240	1.42
13.80	2.96	304.00	20.13	437,760	1.50
14.16	3.12	312.00	21.20	449,280	1.57
14.52	3.28	320.00	22.16	460,800	1.66
14.89	3.45	328.00	23.16	472,320	1.74
15.25	3.62	336.00	24.30	483,840	1.83
15.61	3.79	344.00	25.46	495,360	1.91
15.98	3.97	352.00	26.52	506,880	2.00
16.34	4.15	360.00	27.56	518,400	2.10
16.70	4.34	368.00	28.79	529,920	2.19
17.07	4.53	376.00	30.08	541,440	2.29
17.43	4.72	384.00	31.17	552,960	2.39

DIAMETER THREE INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 100 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
17.79	4.92	392.00	32.47	564,480	2.48
18.16	5.13	400.00	33.84	576,000	2.59
18.52	5.33	408.00	34.98	587,520	2.69
18.88	5.54	416.00	36.35	599,040	2.80
19.24	5.75	424.00	37.75	610,560	2.91
19.61	5.98	432.00	38.98	622,080	3.02
19.97	6.20	440.00	40.42	633,600	3.13
20.33	6.43	448.00	41.89	645,120	3.24
20.70	6.66	456.00	43.17	656,640	3.36
21.06	6.90	464.00	44.68	668,160	3.48
21.42	7.13	472.00	46.22	679,680	3.60
21.79	7.38	480.00	47.54	691,200	3.73
22.15	7.63	488.00	49.12	702,720	3.85
22.51	7.88	496.00	50.41	714,240	3.98
22.88	8.14	504.00	52.09	725,760	4.11
23.24	8.40	512.00	53.74	737,280	4.24
23.60	8.66	520.00	55.42	748,800	4.37
23.97	8.93	528.00	57.17	760,320	4.51
24.33	9.20	536.00	58.90	771,840	4.65
24.69	9.48	544.00	60.27	783,360	4.79
25.05	9.76	552.00	62.04	794,880	4.93
25.42	10.05	560.00	63.89	806,400	5.07
25.78	10.33	568.00	65.30	817,920	5.22
26.14	10.62	576.00	67.14	829,440	5.36

DIAMETER THREE INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 100 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
26.51	10.93	584.00	69.05	840,960	5.52
26.87	11.22	592.00	70.94	852,480	5.67
27.23	11.53	600.00	72.85	864,000	5.82
27.60	11.84	608.00	74.37	875,520	5.98
27.96	12.15	616.00	76.32	887,040	6.14
28.32	12.47	624.00	78.30	898,560	6.30
28.69	12.80	632.00	79.85	910,080	6.46
29.05	13.12	640.00	81.87	921,600	6.63
29.41	13.45	648.00	83.91	933,120	6.79
29.77	13.78	656.00	85.97	944,640	6.96
30.14	14.12	664.00	88.12	956,160	7.13
30.50	14.46	672.00	90.24	967,680	7.30
30.86	14.81	680.00	92.39	979,200	7.48
31.23	15.16	688.00	94.61	990,720	7.66
31.59	15.51	696.00	96.19	1,002,240	7.83
31.95	15.87	704.00	98.39	1,013,760	8.01
32.32	16.24	712.00	100.68	1,025,280	8.20
32.68	16.60	720.00	102.94	1,036,800	8.38
33.04	16.97	728.00	105.22	1,048,320	8.57
33.41	17.35	736.00	107.59	1,059,840	8.76
33.77	17.73	744.00	109.21	1,071,360	8.95
34.13	18.11	752.00	111.55	1,082,880	9.15
34.50	18.50	760.00	113.98	1,094,400	9.34
34.86	18.89	768.00	116.38	1,105,920	9.54

DIAMETER THREE INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 100 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
35.22	19.28	776.00	118.79	1,117,440	9.74
35.58	19.68	784.00	121.23	1,128,960	9.94
35.95	20.09	792.00	123.77	1,140,480	10.15
36.31	20.50	800.00	126.26	1,152,000	10.35
36.67	20.90	808.00	128.77	1,163,520	10.56
37.04	21.33	816.00	131.39	1,175,040	10.77
37.40	21.75	824.00	133.95	1,186,560	10.98
37.76	22.17	832.00	135.66	1,198,080	11.19
38.13	22.60	840.00	138.33	1,209,600	11.41
38.49	23.03	848.00	140.95	1,221,120	11.63
38.85	23.46	856.00	142.66	1,232,640	11.85
39.22	23.91	864.00	145.39	1,244,160	12.08
39.58	24.35	872.00	148.08	1,255,680	12.30
39.94	24.80	880.00	150.78	1,267,200	12.52
40.30	25.25	888.00	153.51	1,278,720	12.75
40.67	25.71	896.00	156.34	1,290,240	12.99
41.03	26.17	904.00	159.12	1,301,760	13.22
41.39	26.63	912.00	161.93	1,313,280	13.45
41.76	27.11	920.00	164.84	1,324,800	13.69
42.12	27.58	928.00	167.69	1,336,320	13.93
42.48	28.05	936.00	170.57	1,347,840	14.17
42.85	28.54	944.00	172.41	1,359,360	14.42
43.21	29.03	952.00	175.32	1,370,880	14.66
43.57	29.51	960.00	178.25	1,382,400	14.90

DIAMETER THREE INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 100 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
43.94	30.02	968.00	181.29	1,393,920	15.16
44.30	30.51	976.00	184.28	1,405,440	15.41
44.66	31.01	984.00	187.28	1,416,960	15.66
45.03	31.52	992.00	190.40	1,428,480	15.92
45.39	32.03	1,000.00	193.46	1,440,000	16.17
45.75	32.54	1,008.00	195.24	1,451,520	16.43
46.11	33.05	1,016.00	198.32	1,463,040	16.69
46.48	33.59	1,024.00	201.52	1,474,560	16.96
46.84	34.11	1,032.00	204.65	1,486,080	17.22
47.20	34.63	1,040.00	207.81	1,497,600	17.49
47.57	35.18	1,048.00	211.08	1,509,120	17.77
47.93	35.71	1,056.00	214.29	1,520,640	18.04
48.29	36.25	1,064.00	217.52	1,532,160	18.31
48.66	36.81	1,072.00	219.39	1,543,680	18.59
49.02	37.36	1,080.00	222.65	1,555,200	18.87
49.38	37.91	1,088.00	225.93	1,566,720	19.14
49.75	38.48	1,096.00	229.33	1,578,240	19.43
50.11	39.04	1,104.00	232.66	1,589,760	19.71

Supplementary Table of Theoretical Velocities, to be Used in Obtaining Results Beyond the Highest Limits of Table No. 1.

($2g = 64.4$.)

v	$\frac{v^2}{2g}$	v	$\frac{v^2}{2g}$	v	$\frac{v^2}{2g}$	v	$\frac{v^2}{2g}$
49.5	38	70.4	77	86.4	116	99.9	155
50.1	39	70.9	78	86.8	117	100.2	156
50.7	40	71.3	79	87.2	118	100.6	157
51.3	41	71.8	80	87.6	119	100.9	158
52.0	42	72.2	81	87.9	120	101.2	159
52.6	43	72.6	82	88.3	121	101.5	160
53.2	44	73.1	83	88.6	122	101.8	161
53.8	45	73.5	84	89.0	123	102.1	162
54.4	46	74.0	85	89.4	124	102.5	163
55.0	47	74.4	86	89.7	125	102.8	164
55.6	48	74.8	87	90.1	126	103.1	165
56.2	49	75.3	88	90.4	127	103.4	166
56.7	50	75.7	89	90.8	128	103.7	167
57.3	51	76.1	90	91.1	129	104.0	168
57.8	52	76.5	91	91.5	130	104.3	169
58.4	53	76.9	92	91.8	131	104.6	170
59.0	54	77.4	93	92.2	132	104.9	171
59.5	55	77.8	94	92.5	133	105.3	172
60.0	56	78.2	95	92.9	134	105.6	173
60.6	57	78.6	96	93.2	135	105.9	174
61.1	58	79.0	97	93.6	136	106.2	175
61.6	59	79.4	98	93.9	137	114.	200
62.1	60	79.8	99	94.3	138	120.	225
62.7	61	80.3	100	94.6	139	126.	250
63.2	62	80.6	101	95.0	140	133.	275
63.7	63	81.0	102	95.3	141	139.	300
64.2	64	81.4	103	95.6	142	150.	350
64.7	65	81.8	104	96.0	143	160.	400
65.2	66	82.2	105	96.3	144	170.	450
65.7	67	82.6	106	96.6	145	179.	500
66.2	68	83.0	107	97.0	146	188.	550
66.7	69	83.4	108	97.3	147	197.	600
67.1	70	83.8	109	97 6	148	212.	700
67.6	71	84.2	110	98.0	149	227.	800
68.1	72	84.5	111	98.3	150	241.	900
68.5	73	84.9	112	98.6	151	254.	1,000
69.0	74	85.3	113	98.9	152	311.	1,500
69.5	75	85.7	114	99.3	153	359.	2,000
69.9	76	86.1	115	99.6	154	401.	2,500
						440.	3,000

TABLE No. 2,

SHOWING THE LOSS OF HEAD DUE TO THE FRICTION OF WATER IN PIPES HAVING INTERIOR SIDES SIMILAR TO NEW CAST-IRON PIPES.

This table shows the Loss of Head due to the Friction of Water flowing in Pipes having Interior Sides similar to New Cast-Iron Pipes, under different conditions of Velocity and Discharge, or the Inclination necessary to maintain the given Velocity and Discharge. The table also gives the Head required to produce the given Velocity, and the Loss of Head due to the Orifice of Influx.

The table includes pipes of 4-inch, 6-inch, 8-inch, 10-inch, 12-inch, 16-inch, 20-inch, 24-inch, 30-inch, 36-inch, 48-inch and 60-inch in diameter.

The mean internal diameter of the pipe, that each page of the table refers to, is given at the head of each page.

The first column of the table gives the mean velocity in feet per second, of the water flowing in the pipe.

The second column gives the head required to produce the velocity in the first column, calculated by the laws of falling bodies, independent of friction, loss of head due to influx, and other retarding causes.

The third column gives the discharge in U. S. gallons per minute, and the fifth column the discharge in U. S. gallons per twenty-four hours, when the water is flowing in the pipe with the velocity in the first column.

The fourth column gives the loss of head, or the resistance, per 1,000 feet, arising from the friction of the water against the interior sides of the pipe, when the velocity of flow is the same as the velocity in the first column, and the discharge the same as the discharge in the third and fifth columns. This loss of head is also equivalent to the inclination, or slope, on which it would be necessary to lay the pipe in order to maintain the given velocity and discharge. The results in this column were computed by

two formulas, of H. Darcy, given on pages 254, 258 and 368 of his work, entitled, *Recherches expérimentales relatives au mouvement de l'eau dans les tuyaux.* These formulas have been reduced to English measures, under the following forms:

$$h = \left(0.017379 + \frac{0.0015965}{d} + \frac{0.0040723 + \frac{0.000020816}{d^2}}{v} \right) \frac{l}{d} \frac{v^2}{2g}.$$

$$h = \left(0.0198920 + \frac{0.00166573}{d} \right) \frac{l}{d} \frac{v^2}{2g}.$$

In which h = the loss of head due to friction, in feet.

d = the internal diameter of the pipe, in feet.

v = the velocity per second, in feet.

l = the length of the pipe, in feet.

$2g = 64.324$.

The first formula was used for velocities of flow less than 0.33 feet per second, and the

second formula, which is generally known as "Darcy's Formula," for velocities of flow including and exceeding 0.33 feet per second.

When the mean velocity, discharge, and diameter of the pipe are constant, the loss of head due to friction is directly and simply as the length, consequently the loss of head due to friction for any length of pipe can be readily determined from the table.

The sixth column gives the loss of head due to the entrance of the water into the pipe, with the velocity in the first column, when the edges of the inlet end of the pipe are square and flush with the face of a wall or partition. The following formula was used in calculating the results in this column:

$$\text{Loss of head due to influx} = 0.505 \frac{v^2}{2g}.$$

If the pipe is connected with a reservoir, in the manner mentioned in the description of the sixth column, and laid below the hydraulic grade line, the sum of the results given in the second, fourth, and sixth columns, is the total head, or the head that will be required to gene-

rate the velocity in the first column, and the discharge in the third and fifth columns.

Although the table has been computed to such limits that, by the use of the rule relative to the length of the pipe, nearly all of the results that will generally be required in ordinary practice can be directly obtained from the table, it is possible that at times exceptional cases will arise and results may be desired which will be beyond the highest limits of the table. For cases of this kind the table can also be used by the application of the following rule: the diameter and length of the pipe being constant, the loss of head varies as the square of the velocity and conversely the velocity as the square root of the loss of head. Positive results can be obtained in this manner, as the coefficient of friction included in the formula used in computing the highest losses of head due to friction given in the table, is simply dependent upon the diameter and not upon both the diameter and the square root of the velocity as in Weston's formula for very smooth pipes, that was used in computing table No. 1.

Following the table there are two supplementary tables: A and B.

Supplementary table A, is a table of theoretical velocities which is to be used in conjunction with the table when the results desired are beyond the highest limits of the results given in the table.

Supplementary table B, has been given, mainly, for conveniently computing additional results, if it should be desired, for the different columns of the table, beyond the highest results now contained in the table. It can also be used for obtaining positive results for all velocities above 0.33 feet per second. Two ways that it can be used advantageously are shown in examples Nos. 4 and 5.

The loss of head due to friction per 1,000 feet, which may take place in pipes that have been in service five or more years, for velocities above 0.33 feet per second, can be very approximately estimated, for preliminary work, by multiplying the loss of head due to friction given in the fourth column of the table by the following multipliers, which were computed by a

modification of "Darcy's Formula" by the author, in which a formula by Darcy for old pipes and the results of a number of experiments made with pipes that had been in service from about two to about seventeen years were taken into consideration:

Number of Years of Service of the Pipes.	Multipliers.	Number of Years of Service of the Pipes.	Multipliers.
5	1.16	55	2.72
10	1.31	60	2.88
15	1.47	65	3.03
20	1.63	70	3.19
25	1.78	75	3.35
30	1.94	80	3.50
35	2.11	85	3.66
40	2.25	90	3.82
45	2.41	95	3.97
50	2.57	100	4.13

In using the table when other lengths of pipe than 1,000 feet are to be taken into consider-

ation, as well as for cases when the results desired are beyond the highest limits of the table, it will probably be necessary, in some instances, especially for a person who is not in the habit of making hydraulic calculations, to make several trials before the correct result is obtained. A little practice, however, will perceivably facilitate the use of the table.

The following examples illustrate a number of ways in which the information contained in the table can be applied for obtaining results which are not given in the table:

Example No. 1.

Question. What size of pipe will be required to furnish a district with 38,000,000 gallons of water per 24 hours, under 150 feet head; the point of delivery being located 50,000 feet from the resevoir which will supply the water, and its elevation 173 feet below the water line of the same?

Answer. The loss of head in this case must not exceed $173 - 150 = 23$ feet. The table

shows that two 48-inch pipe will deliver the amount of water required with a loss of head of 21.63 feet, viz.: The friction head shown in the table for a 48-inch pipe 1,000 feet long corresponding to a discharge of 38,000,000 gallons $\div 2 = 19{,}000{,}000$ gallons, is 0.43 feet, and for a length of 50,000 feet = 21.50 feet, $21.50 + \left(0.09 = \frac{v^2}{2g}\right) + \left(0.04 = 0.505 \cdot \frac{v^2}{2g}\right) = 21.63$ feet. Four 36-inch pipe will also deliver this amount with a loss of head of 23.10 feet, viz.: The friction head shown in the table for a 36-inch pipe 1,000 feet long corresponding to a discharge of 38,000,000 gallons $\div 4 = 9{,}500{,}000$ gallons, is 0.46 feet, and for a length of 50,000 feet = 23.00 feet, $23.00 + \left(0.07 = \frac{v^2}{2g}\right) + \left(0.03 = 0.505\ \frac{v^2}{2g}\right) = 23.10$ feet.

Example No. 2.

Question. What will be the discharge from a reservoir, in gallons per minute, through a 4-

inch pipe 1,800 feet long, under a total head of 150 feet?

Answer. The ratio of the length used in computing the table to the given length, $\frac{1000}{1800}$, = 0.56, $0.56 \times 150 = 84$ feet; the discharge of a 4-inch pipe corresponding to a friction head of 82.40 feet, which is the nearest to 84 feet, is 330 gallons per minute; the inverse ratio of the lengths, $\frac{1800}{1000}$, = 1.8, $1.8 \times 82.40 = 148.32$ feet,

$$148.32 + \left(1.10 = \frac{v^2}{2g}\right) + \left(0.56 = 0.505\ \frac{v^2}{2g}\right) =$$

149.98 feet. Therefore a 4-inch pipe 1,800 feet long, under a total head of 149.98 feet, will discharge 330 gallons per minute.

Example No. 3.

Question. What will be the discharge from a reservoir, in gallons per minute, through a 4-inch pipe 500 feet long, under a total head of 150 feet?

Answer. The ratio of the length used in

computing the table, to the given length, $\frac{1000}{500}$, = 2, $2 \times 150 = 300$ feet; the discharge of a 4-inch pipe corresponding to a friction head of 300.32 feet, which is the nearest to 300 feet, is 630 gallons per minute; the inverse ratio of the lengths, $\frac{500}{1000}$, $= 0.5$, $0.5 \times 300.32 = 150.16$ feet, $150.16 + \left(4.02 = \frac{v^2}{2g}\right) + \left(2.03 = 0.505 \frac{v^2}{2g}\right)$ = a total head of 156.21 feet. This total head is too large, however, (156.21 — 150 = 6.21). For a second trial take the friction head the next lower in the table, 290.86 feet, which corresponds to a discharge of 620 gallons per minute, $\frac{500}{1000} = 0.5$, $0.5 \times 290.86 = 145.43$,

$$145.43 + \left(3.90 = \frac{v^2}{2g}\right) + \left(1.97 = 0.505 \frac{v^2}{2g}\right)$$

= 151.30 feet. Therefore a 4-inch pipe 500 feet long, under a total head of 151.30 feet, will discharge 620 gallon per minute.

Example No. 4.

Question. What will be the total head required to cause water to flow from a reservoir, at a rate of 20,000,000 gallons per 24 hours, through a 16-inch pipe 1,000 feet long?

Answer. The largest discharge given in the table for a 16-inch pipe is 8,064,000 gallons per 24 hours, and the velocity opposite to this discharge = 8.94 feet. The velocity corresponding to a discharge of 20,000,000 gallons $= \frac{20{,}000{,}000}{8{,}064{,}000} \times 8.94 = 22.17$ feet, or by supplementary table B, $\frac{20{,}000{,}000}{1440}$ = 13,889 gallons per minute, $\frac{13{,}889}{626.70} = 22.16.$

The friction head given in the table opposite to a velocity of 8.94 and a discharge of 8,064,000 = 19.69 feet. The friction head due to a velocity of 22.17 $= \frac{22.17^2}{8.94^2} \times 19.69 = 121.09$ feet, or by supplementary table B, $\frac{20{,}0000{,}00}{1440} = 13{,}889$

gallons per minute, $\frac{13,889}{626.70} = v$, $v^2 \times 0.24649 =$ 121.06.

$\frac{v^2}{2g} + \frac{v^2}{2g} \times 0.505$ given in the table opposite to a velocity of 8.94 and a discharge of 8,064,000 $(1.24 + 0.63) = 1.87$ feet, $1.87 \times \frac{22.17^2}{8.94^2} = 11.50$ feet, or by supplementary table B, $\frac{20,000,000}{1440} = 13,889$ gallons per minute,

$\frac{13,889}{626.70} = v$, $v^2 \times (0.01555 + 0.007851) = 11.49$.

Therefore the total head required is $121.09 + 11.50 = 132.59$ feet.

Example No. 5.

Question. What will be the total head required to cause water to flow from a reservoir, at a rate of 40,000,000 gallons per 24 hours, through a 36-inch pipe 50,000 feet long?

Answer. The largest discharge given in the table for a 36-inch pipe is 28,800,000 gallons per

24 hours, and the velocity opposite to this discharge = 6.30 feet. The velocity corresponding to a discharge of 40,000,000 gallons = $\frac{40,000,000}{28,800,000} \times 6.30 = 8.76$ feet, or by supplementary table B, $\frac{40,000,000}{1440} = 27,778$ gallons per minute, $\frac{27,778}{3172.62} = 8.76$.

The friction head given in the table opposite to a velocity of 6.30 and a discharge of 28,800,000 = 4.21 feet. The friction head for a length of 1,000 feet, due to a velocity of $8.76 = \frac{8.76^2}{6.30^2} \times 4.21 = 8.13$ feet, or by supplementary table B, $\frac{40,000,000}{1440} = 27,778$ gallons per minute, $\frac{27,778}{3172.62} = v$, $v^2 \times 0.10597 = 8.13$. The friction head for a length of 50,000 feet, is the inverse ratio of the length used in computing the table to the given length multiplied by the friction head for a length of 1,000 feet, $= \frac{50,000}{1000} \times 8.13 = 406.50$ feet.

$\frac{v^2}{2g} + \frac{v^2}{2g} \times 0.505$ given in the table opposite to a velocity of 6.30 and a discharge of 28,800,000 $(0.62 + 0.31) = 0.93$ feet, $0.93 \times \frac{8.76^2}{6.30^2} = 1.80$ feet, or by supplementary table B, $\frac{40{,}000{,}000}{1440} =$ 27,778 gallons per minute, $\frac{27{,}778}{3172.62} = v$, $v^2 \times (0.01555 + 0.007851) = 1.80$.

Therefore the total head required is 406.50 + 1.80 = 408.30 feet.

Example No. 6.

Question. What will be the discharge from a reservoir, in gallons per minute, through a 12-inch pipe 1,000 feet long under a total head of 200 feet?

Answer. The friction head given in the table, for a 12-inch pipe, opposite to the velocity of 10 feet is 33.56 feet, and the total head, 33.56, + $\left(\frac{v^2}{2g} + \frac{v^2}{2g} \times 0.505 = \right) 2.35, = 35.91$ feet. As a

total head of 35.91 feet will produce a velocity of 10 feet, assume 20 feet as the increased velocity which would be produced by 200 feet, the given total head. The supplementary table of theoretical velocities A, shows that $\frac{v^2}{2g}$ for a velocity of 20 is 6.2 feet and $\frac{v^2}{2g} \times 0.505 =$ 3.13 feet, $6.2 + 3.13 = 9.33$ feet, $200 - 9.33 =$ 190.67 feet, which is to be used as an assumed friction head; the square root of the assumed friction head 190.67 divided by the square root of 33.56, the friction head taken from the table, corresponding to 10, the highest velocity, $= \frac{13.81}{5.79}, = 2.39$, 2.39×10 (the velocity from the table), $= 23.9$ feet, which is the resultant velocity, $\frac{v^2}{2g} + \frac{v^2}{2g} \times 0.505$ for a velocity of 23.9, is found by the aid of the supplementary table of theoretical velocities A, to be 13.39 feet, 13.39 + 190.67 (the assumed friction head for a velocity of 20 feet), = a total head of 204.06 feet. If the assumed velocity had been the

actual velocity this 204.06 would have been equal to 200 the given total head, and the resultant velocity 23.9 the same as 20, the assumed velocity, and as their differences are so great (204.06—200=4.06 and 23.9—20=3.9), it will be necessary to make, at least, one more trial.

For the second trial assume a velocity of 23.5 feet. The supplementary table of theoretical velocities A, shows that $\frac{v^2}{2g}+\frac{v^2}{2g}\times 0.505$ for a velocity of 23.5 is 12.94 feet, 200 — 12.94 = 187.06 feet; the square root of the assumed friction head 187.06 divided by the square root of 33.56, the friction head taken from the table corresponding to 10, the highest velocity, = $\frac{13.67}{5.79}=2.36$, 2.36×10 (the velocity from the table), = 23.6 feet which is the resultant velocity, $\frac{v^2}{2g}+\frac{v^2}{2g}\times 0.505$ for a velocity of 23.6 is found by the aid of the supplementary table of theoretical velocities A, to be 13.09 feet, 13.09 + 187.06 (the assumed friction head for a velocity of 23.5 feet), = a total head of 200.15 feet.

This result is sufficiently near as the total heads check to within 0.15 foot (200.15 — 200) and the velocities to within 0.1 feet (23.6 — 23.5). To obtain the discharge in gallons per minute, multiply 3,525 (the gallons per minute given in the table corresponding to a velocity of 10), by 2.36 (the ratio of the square roots of the friction heads), $3{,}525 \times 2.36 = 8{,}319$ gallons. Therefore a 12-inch pipe 1,000 feet long, under a total head of 200 feet will discharge about 8,319 gallons per minute.

Example No. 7.

Question. What will be the discharge from a reservoir, in gallons per minute, through a 12-inch pipe 100 feet long, under a total head of 50 feet?

Answer. The inverse ratio of the length used in computing the table to the given length, $\frac{100}{1000}, = 0.10$, 33.56 feet is the friction head given in the table, for a 12-inch pipe, opposite to the velocity of 10 feet, $33.56 \times 0.10 = 3.36$

feet, the friction head in a pipe 100 feet long corresponding to a velocity of 10 feet, and the total head, $3.36 + \left(\frac{v^2}{2g} + \frac{v^2}{2g} \times 0.505 = \right) 2.35, =$ 5.71 feet. As a total head of 5.71 feet will produce a velocity of 10 feet, assume 28 feet as the increased velocity which would be produced by 50 feet, the given total head. The supplementary table of theoretical velocities A, shows that $\frac{v^2}{2g}$ for a velocity of 28 is 12.2 feet and $\frac{v^2}{2g} \times 0.505 = 6.16$ feet, $12.2 + 6.16 = 18.36$ feet, 50—18.36 = 31.64 feet, which is to be used as an assumed friction head; 31.64 multiplied by the ratio of the lengths, $\frac{1000}{100}$, = 10, = 316.4 feet; the square root of the assumed friction head 316.4 divided by the square root of 33.56, the friction head taken from the table corresponding to 10, the highest velocity, $= \frac{17.79}{5.79} = 3.07$, 3.07×10 (the velocity from the table), = 30.7 feet which is the resultant velocity, $\frac{v^2}{2g} + \frac{v^2}{2g} \times 0.505$ for

a velocity of 30.7 is found by the aid of the supplementary table of theoretical velocities A, to be 22.12 feet, 22.12 + 31.64 (the assumed friction head for a velocity of 28 feet in a pipe 100 feet long), = a total head of 53.76 feet. If the assumed velocity had been the actual velocity, this 53.76 would have been equal to 50 the given total head, and the resultant velocity 30.7 the same as the assumed velocity 28, and as their differences are so great (53.76 — 50 = 3.76 and 30.7 — 28, = 2.7), it will be necessary to make, at least, one more trial.

For the second trial assume a velocity of 29.5 feet. The supplementary table of theoretical velocities A, shows that $\frac{v^2}{2g} + \frac{v^2}{2g} \times 0.505$ for a velocity of 29.5 is 20.32 feet, 50 — 20.32 = 29.68 feet, $29.68 \times \frac{1000}{100}$, = 296.8 feet; the square root of the assumed friction head 296.8 divided by the square root of 33.56, the friction head taken from the table corresponding to 10, the highest velocity, $= \frac{17.23}{5.79} = 2.98$, 2.98×10

(the velocity from the table), = 29.8 feet, which is the resultant velocity, $\frac{v^2}{2g} + \frac{v^2}{2g} \times 0.505$ for a velocity of 29.8 is found by the aid of the supplementary table of theoretical velocities A, to be 20.77 feet, 20.77 + 29.68 (the assumed friction head for a velocity of 29.5 feet in a pipe 100 feet long), = a total head of 50.45 feet. This result is sufficiently near as the total heads check to within 0.45 foot (50.45 — 50) and the velocities to within 0.3 feet (29.8 — 29.5). To obtain the discharge in gallons per minute, multiply 3,525 (the gallons per minute given in the table corresponding to a velocity of 10), by 2.98 (the ratio of the square roots of the friction heads), 3,525 × 2.98 = 10,505 gallons. Therefore a 12-inch pipe 100 feet long, under a total head of 50 feet, will discharge about 10,505 gallons per minute.

DIAMETER FOUR INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 1000 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
0.26	0.00	10	0.12	14,400	0.00
0.51	0.00	20	0.30	28,800	0.00
0.77	0.01	30	0.68	43,200	0.00
1.02	0.02	40	1.21	57,600	0.01
1.28	0.03	50	1.89	72,000	0.01
1.53	0.04	60	2.72	86,400	0.02
1.79	0.05	70	3.71	100,800	0.03
2.04	0.06	80	4.84	115,200	0.03
2.30	0.08	90	6.13	129,600	0.04
2.55	0.10	100	7.57	144,000	0.05
2.81	0.12	110	9.16	158,400	0.06
3.06	0.15	120	10.90	172,800	0.07
3.32	0.17	130	12.79	187,200	0.09
3.57	0.20	140	14.83	201,600	0.10
3.83	0.23	150	17.02	216,000	0.12
4.09	0.26	160	19.37	230,400	0.13
4.34	0.29	170	21.87	244,800	0.15
4.60	0 33	180	24.52	259,200	0.17
4.85	0.37	190	27.32	273,600	0.18
5.11	0.41	200	30.27	288,000	0.20
5.36	0.45	210	33.37	302,400	0.23
5.62	0.49	220	36.62	316,800	0.25
5.87	0.54	230	40.03	331,200	0.27
6.13	0.58	240	43.58	345,600	0.29

DIAMETER FOUR INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 1000 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
6.38	0.63	250	47.29	360,000	0.32
6.64	0.69	260	51.15	374,400	0.35
6.89	0.74	270	55.16	388,800	0.37
7.15	0.79	280	59.32	403,200	0.40
7.40	0.85	290	63.63	417,600	0.43
7.66	0.91	300	68.10	432,000	0.46
7.91	0.97	310	72.71	446,400	0.49
8.17	1.04	320	77.48	460,800	0.52
8.43	1.10	330	82.40	475,200	0.56
8.68	1.17	340	87.47	489,600	0.59
8.94	1.24	350	92.69	504,000	0.63
9.19	1.31	360	98.06	518,400	0.66
9.45	1.39	370	103.59	532,800	0.70
9.70	1.46	380	109.26	547,200	0.74
9.96	1.54	390	115.09	561,600	0.78
10.21	1.62	400	121.06	576,000	0.82
10.47	1.70	410	127.19	590,400	0.86
10.72	1.79	420	133.47	604,800	0.90
10.98	1.87	430	139.90	619,200	0.95
11.23	1.96	440	146.49	633,600	0.99
11.49	2.05	450	153.22	648,000	1.04
11.74	2.14	460	160.11	662,400	1.08
12.00	2.24	470	167.14	676,800	1.13
12.26	2.33	480	174.33	691,200	1.18

DIAMETER FOUR INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 1000 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
12.51	2.43	490	181.67	705,600	1.23
12.77	2.53	500	189.16	720,000	1.28
13.02	2.64	510	196.80	734,400	1.33
13.28	2.74	520	204.61	748,800	1.38
13.53	2.85	530	212.54	763,200	1.44
13.79	2.96	540	220.64	777,600	1.49
14.04	3.07	550	228.89	792,000	1.55
14.30	3.18	560	237.29	806,400	1.60
14.55	3.29	570	245.84	820,800	1.66
14.81	3.41	580	254.54	835,200	1.72
15.06	3.53	590	263.39	849,600	1.78
15.32	3.65	600	272.39	864,000	1.84
15.57	3.77	610	281.55	878,400	1.90
15.83	3.90	620	290.86	892,800	1.97
16.08	4.02	630	300.32	907,200	2.03
16.34	4.15	640	309.92	921,600	2.10
16.60	4.28	650	319.68	936,000	2.16
16.85	4.41	660	329.60	950,400	2.23
17.11	4.55	670	339.66	964,800	2.30
17.36	4.69	680	349.88	979,200	2.37
17.62	4.82	690	360.24	993,600	2.44
17.87	4.97	700	370.76	1,008,000	2.51
18.13	5.11	710	381.43	1,022,400	2.58
18.38	5.25	720	392.25	1,036,800	2.65

DIAMETER FOUR INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 1000 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
18.64	5.40	730	403.22	1,051,200	2.73
18.89	5.55	740	414.34	1,065,600	2.80
19.15	5.70	750	425.62	1,080,000	2.88
19.40	5.85	760	437.04	1,094,400	2.96
19.66	6.01	770	448.62	1,108,800	3.03
19.91	6.17	780	460.35	1,123,200	3.11
20.17	6.32	790	472.23	1,137,600	3.19
20.43	6.49	800	484.26	1,152,000	3.28
20.68	6.65	810	496.44	1,166,400	3.36
20.94	6.81	820	508.77	1,180,800	3.44
21.19	6.98	830	521.26	1,195,200	3.53
21.45	7.15	840	533.89	1,209,600	3.61
21.70	7.32	850	546.68	1,224,000	3.70
21.96	7.49	860	559.62	1,238,400	3.78
22.21	7.67	870	572.71	1,252,800	3.87
22.47	7.85	880	585.95	1,267,200	3.96
22.72	8.03	890	599.34	1,281,600	4.05
22.98	8.21	900	612.89	1,296,000	4.15

DIAMETER SIX INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 1000 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
0.28	0.00	25	0.09	36,000	0.00
0.57	0.00	50	0.23	72,000	0.00
0.85	0.01	75	0.52	108,000	0.01
1.13	0.02	100	0.93	144,000	0.01
1.42	0.03	125	1.45	180,000	0.02
1.70	0.04	150	2.09	216,000	0.02
1.99	0.06	175	2.85	252,000	0.03
2.27	0.08	200	3.72	288,000	0.04
2.55	0.10	225	4.70	324,000	0.05
2.84	0.12	250	5.81	360,000	0.06
3.12	0.15	275	7.03	396,000	0.08
3.40	0.18	300	8.36	432,000	0.09
3.69	0.21	325	9.82	468,000	0.11
3.97	0.24	350	11.38	504,000	0.12
4.25	0.28	375	13.07	540,000	0.14
4.54	0.32	400	14.87	576,000	0.16
4.82	0.36	425	16.79	612,000	0.18
5.11	0.41	450	18.82	648,000	0.21
5.39	0.45	475	20.97	684,000	0.23
5.67	0.50	500	23.23	720,000	0.25
5.96	0.55	525	25.62	756,000	0.28
6.24	0.61	550	28.11	792,000	0.31
6.52	0.66	575	30.73	828,000	0.34
6.81	0.72	600	33.46	864,000	0.36

DIAMETER SIX INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 1000 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
7.09	0.78	625	36.30	900,000	0.40
7.37	0.85	650	39.26	936,000	0.43
7.66	0.91	675	42.34	972,000	0.46
7.94	0.98	700	45.54	1,008,000	0.50
8.23	1.05	725	48.85	1,044,000	0.53
8.51	1.13	750	52.27	1,080,000	0.57
8.79	1.20	775	55.82	1,116,000	0.61
9.08	1.28	800	59.48	1,152,000	0.65
9.36	1.36	825	63.25	1,188,000	0.69
9.64	1.45	850	67.14	1,224,000	0.73
9.93	1.53	875	71.15	1,260,000	0.77
10.21	1.62	900	75.28	1,296,000	0.82
10.49	1.71	925	79.52	1,332,000	0.87
10.78	1.81	950	83.87	1,368,000	0.91
11.06	1.90	975	88.35	1,404,000	0.96
11.35	2.00	1,000	92.93	1,440,000	1.01
11.63	2.10	1,025	97.64	1,476,000	1.06
11.91	2.21	1,050	102.46	1,512,000	1.12
12.20	2.31	1,075	107.40	1,548,000	1.17
12.48	2.42	1,100	112.45	1,584,000	1.22
12.76	2.53	1,125	117.62	1,620,000	1.28
13.05	2.65	1,150	122.90	1,656,000	1.34
13.33	2.76	1,175	128.31	1,692,000	1.40
13.61	2.88	1,200	133.82	1,728,000	1.46

DIAMETER SIX INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 1000 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
13.90	3.00	1,225	139.46	1,764,000	1.52
14.18	3.13	1,250	145.21	1,800,000	1.58
14.47	3.25	1,275	151.08	1,836,000	1.65
14.75	3.38	1,300	157.06	1,872,000	1.71
15.03	3.51	1,325	163.16	1,908,000	1.78
15.32	3.65	1,350	169.37	1,944,000	1.84
15.60	3.78	1,375	175.70	1,980,000	1.91
15.88	3.92	1,400	182.15	2,016,000	1.98
16.17	4.06	1,425	188.71	2,052,000	2.05
16.45	4.22	1,450	195.39	2,088,000	2.13
16.73	4.35	1,475	202.19	2,124,000	2.20
17.02	4.50	1,500	209.10	2,160,000	2.27
17.30	4.65	1,525	216.13	2,196,000	2.35
17.59	4.81	1,550	223.27	2,232,000	2.43
17.87	4.96	1,575	230.53	2,268,000	2.51
18.15	5.12	1,600	237.91	2,304,000	2.59
18.44	5.28	1,625	245.40	2,340,000	2.67
18.72	5.45	1,650	253.01	2,376,000	2.75
19.00	5.61	1,675	260.74	2,412,000	2.84
19.29	5.78	1,700	268.58	2,448,000	2.92
19.57	5.95	1,725	276.54	2,484,000	3.01
19.85	6 13	1,750	284.61	2,520,000	3.09
20.14	6.31	1,775	292.80	2,556,000	3.18
20.42	6.48	1,800	301.10	2,592,000	3.27

DIAMETER SIX INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 1000 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
20.71	6.66	1,825	309.53	2,628,000	3.37
20.99	6.85	1,850	318.07	2,664,000	3.46
21.27	7.04	1,875	326.72	2,700,000	3.55
21.56	7.22	1,900	335.49	2,736,000	3.65
21.84	7.42	1,925	344.38	2,772,000	3.74
22.12	7.61	1,950	353.38	2,808,000	3.84
22.41	7.81	1,975	362.50	2,844,000	3.94
22.69	8.00	2,000	371.73	2,880,000	4.04

DIAMETER EIGHT INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 1000 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
0.16	0.00	25	0.03	36,000	0.00
0.32	0.00	50	0.08	72,000	0.00
0.48	0.00	75	0.12	108,000	0.00
0.64	0.01	100	0.21	144,000	0.00
0.80	0.01	125	0.33	180,000	0.00
0.96	0.01	150	0.48	216,000	0.01
1.12	0.02	175	0.65	252,000	0.01
1.28	0.02	200	0.85	288,000	0.01
1.44	0.03	225	1.08	324,000	0.02
1.60	0.04	250	1.33	360,000	0.02
1.76	0.05	275	1.61	396,000	0.02
1.91	0.06	300	1.92	432,000	0.03
2.07	0.07	325	2.25	468,000	0.03
2.23	0.08	350	2.61	504,000	0.04
2.39	0.09	375	2.99	540,000	0.05
2.55	0.10	400	3.40	576,000	0.05
2.71	0.11	425	3.84	612,000	0.06
2.87	0.13	450	4.31	648,000	0.06
3.03	0.14	475	4.80	684,000	0.07
3.19	0.16	500	5.32	720,000	0.08
3.35	0.17	525	5.86	756,000	0.09
3.51	0.19	550	6.44	792,000	0.10
3.67	0.21	575	7.03	828,000	0.11
3.83	0.23	600	7.66	864,000	0.12

DIAMETER EIGHT INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 1000 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
3.99	0.25	625	8.31	900,000	0.13
4.15	0.27	650	8.99	936,000	0.14
4.31	0.29	675	9.69	972,000	0.15
4.47	0.31	700	10.42	1,008,000	0.16
4.63	0.33	725	11.18	1,044,000	0.17
4.79	0.36	750	11.97	1,080,000	0.18
4.95	0.38	775	12.78	1,116,000	0.19
5.11	0.41	800	13.61	1,152,000	0.20
5.27	0.43	825	14.48	1,188,000	0.22
5.43	0.46	850	15.37	1,224,000	0.23
5.58	0.49	875	16.29	1,260,000	0.25
5.74	0.51	900	17.23	1,296,000	0.26
5.90	0.54	925	18.20	1,332,000	0.27
6.06	0.57	950	19.20	1,368,000	0.29
6.22	0.60	975	20.22	1,404,000	0.30
6.38	0.63	1,000	21.27	1,440,000	0.32
6.54	0.67	1,025	22.35	1,476,000	0.34
6.70	0.70	1,050	23.45	1,512,000	0.35
6.86	0.73	1,075	24.58	1,548,000	0.37
7.02	0.77	1,100	25.74	1,584,000	0.39
7.18	0.80	1,125	26.92	1,620,000	0.41
7.34	0.84	1,150	28.13	1,656,000	0.42
7.50	0.87	1,175	29.37	1,692,000	0.44
7.66	0.91	1,200	30.63	1,728,000	0.46

DIAMETER EIGHT INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 1000 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
7.82	0.95	1,225	31.92	1,764,000	0.48
7.98	0.99	1,250	33.24	1,800,000	0.50
8.14	1.03	1,275	34.58	1,836,000	0.52
8.30	1.07	1,300	35.95	1,872,000	0.54
8.46	1.11	1,325	37.34	1,908,000	0.56
8.62	1.15	1,350	38.77	1,944,000	0.58
8.78	1.20	1,375	40.22	1,980,000	0.61
8.94	1.24	1,400	41.69	2,016,000	0.63
9.10	1.29	1,425	43.19	2,052,000	0.65
9.26	1.33	1,450	44.72	2,088,000	0.67
9.41	1.38	1,475	46.28	2,124,000	0.70
9.57	1.43	1,500	47.86	2,160,000	0.72
9.73	1.47	1,525	49.47	2,196,000	0.74
9.89	1.52	1,550	51.10	2,232,000	0.77
10.05	1.57	1,575	52.77	2,268,000	0.79
10.21	1.62	1,600	54.45	2,304,000	0.82
10.37	1.67	1,625	56.17	2,340,000	0.85
10.53	1.72	1,650	57.91	2,376,000	0.87
10.69	1.78	1,675	59.68	2,412,000	0.90
10.85	1.83	1,700	61.47	2,448,000	0.93
11.01	1.88	1,725	63.29	2,484,000	0.95
11.17	1.94	1,750	65.14	2,520,000	0.98
11.33	2.00	1,775	67.02	2,556,000	1.01
11.49	2.05	1,800	68.92	2,592,000	1.03

DIAMETER EIGHT INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 1000 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
11.65	2.11	1,825	70.85	2,628,000	1.07
11.81	2.17	1,850	72.80	2,664,000	1.09
11.97	2.23	1,875	74.78	2,700,000	1.12
12.13	2.29	1,900	76.79	2,736,000	1.15
12.29	2.35	1,925	78.82	2,772,000	1.18
12.45	2.41	1,950	80.88	2,808,000	1.21
12.61	2.47	1,975	82.97	2,844,000	1.25
12.77	2.53	2,000	85.08	2,880,000	1.28
12.93	2.60	2,025	87.22	2,916,000	1.31
13.08	2.66	2,050	89.39	2,952,000	1.34
13.24	2.73	2,075	91.59	2,988,000	1.37
13.40	2.79	2,100	93.80	3,024,000	1.41
13.56	2.86	2,125	96.05	3,060,000	1.44
13.72	2.93	2,150	98.33	3,096,000	1.48
13.88	3.00	2,175	100.63	3,132,000	1.51
14.04	3.07	2,200	102.95	3,168,000	1.55
14.20	3.14	2,225	105.30	3,204,000	1.58
14.36	3.21	2,250	107.68	3,240,000	1.62
14.52	3.28	2,275	110.09	3,276,000	1.66
14.68	3.35	2,300	112.52	3,312,000	1.69
14.84	3.42	2,325	114.98	3,348,000	1.73
15.00	3.50	2,350	117.47	3,384,000	1.77
15.16	3.57	2,375	119.98	3,420,000	1.81
15.32	3.65	2,400	122.52	3,456,000	1.84

DIAMETER EIGHT INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 1000 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
15.48	3.72	2,425	125.09	3,492,000	1.88
15 64	3.80	2,450	127.68	3,528,000	1.92
15.80	3.88	2,475	130.30	3,564,000	1.96
15.96	3.96	2,500	132.94	3,600,000	2.00
16.12	4.04	2,525	135.62	3,636,000	2.04
16.28	4.12	2,550	138.31	3,672,000	2.08
16.44	4.20	2,575	141.04	3,708,000	2.12
16.60	4.28	2,600	143.79	3,744,000	2.16

DIAMETER TEN INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 1000 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
0.10	0.00	25	0.01	36,000	0.00
0.20	0.00	50	0.03	72,000	0.00
0.31	0.00	75	0.06	108,000	0.00
0.41	0.00	100	0.07	144,000	0.00
0.51	0.00	125	0.11	180,000	0.00
0.61	0.01	150	0.15	216,000	0.00
0.71	0.01	175	0.21	252,000	0.00
0.82	0.01	200	0.27	288,000	0.01
0.92	0.01	225	0.35	324,000	0.01
1.02	0.02	250	0.43	360,000	0.01
1.12	0.02	275	0.52	396,000	0.01
1.23	0.02	300	0.61	432,000	0.01
1.33	0.03	325	0.72	468,000	0.01
1.43	0.03	350	0.83	504,000	0.02
1.53	0.04	375	0.96	540,000	0.02
1.63	0.04	400	1.09	576,000	0.02
1.74	0.05	425	1.23	612,000	0.02
1.84	0.05	450	1.38	648,000	0.03
1.94	0.06	475	1.54	684,000	0.03
2.04	0.06	500	1.70	720,000	0.03
2.14	0.07	525	1.88	756,000	0.04
2.25	0.08	550	2.06	792,000	0.04
2.35	0.09	575	2.25	828,000	0.04
2.45	0.09	600	2.45	864,000	0.05

DIAMETER TEN INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 1000 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
2.55	0.10	625	2.66	900,000	0.05
2.66	0.11	650	2.88	936,000	0.05
2.76	0.12	675	3.11	972,000	0.06
2.86	0.13	700	3.34	1,008,000	0.06
2.96	0.14	725	3.58	1,044,000	0.07
3.06	0.15	750	3.83	1,080,000	0.07
3.17	0.16	775	4.09	1,116,000	0.08
3.27	0.17	800	4.36	1,152,000	0.08
3.37	0.18	825	4.64	1,188,000	0.09
3.47	0.19	850	4.92	1,224,000	0.09
3.57	0.20	875	5.22	1,260,000	0.10
3.68	0.21	900	5.52	1,296,000	0.11
3.78	0.22	925	5.83	1,332,000	0.11
3.88	0.23	950	6.15	1,368,000	0.12
3.98	0.25	975	6.48	1,404,000	0.12
4.09	0.26	1,000	6.82	1,440,000	0.13
4.19	0.27	1,025	7.16	1,476,000	0.14
4.29	0.29	1,050	7.51	1,512,000	0.14
4.39	0.30	1,075	7.88	1,548,000	0.15
4.49	0.31	1,100	8.25	1,584,000	0.16
4.60	0.33	1,125	8.63	1,620,000	0.17
4.70	0.34	1,150	9.01	1,656,000	0.17
4.80	0.36	1,175	9.41	1,692,000	0.18
4.90	0.37	1,200	9.81	1,728,000	0.19

DIAMETER TEN INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 1000 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
5.00	0.39	1,225	10.23	1,764,000	0.20
5.11	0.41	1,250	10.65	1,800,000	0.20
5.21	0.42	1,275	11.08	1,836,000	0.21
5.31	0.44	1,300	11.52	1,872,000	0.22
5.41	0.46	1,325	11.96	1,908,000	0.23
5.51	0.47	1,350	12.42	1,944,000	0.24
5.62	0.49	1,375	12.88	1,980,000	0.24
5.72	0.51	1,400	13.36	2,016,000	0.26
5.82	0.53	1,425	13.84	2,052,000	0.27
5.92	0.55	1,450	14.33	2,088,000	0.28
6.03	0.56	1,475	14.83	2,124,000	0.28
6.13	0.58	1,500	15.33	2,160,000	0.29
6.23	0.60	1,525	15.85	2,196,000	0.30
6.33	0.62	1,550	16.37	2,232,000	0.31
6.43	0.64	1,575	16.91	2,268,000	0.32
6.54	0.66	1,600	17.45	2,304,000	0.34
6.64	0.69	1,625	18.00	2,340,000	0.35
6.74	0.71	1,650	18.55	2,376,000	0.36
6.84	0.73	1,675	19.12	2,412,000	0.36
6.94	0.75	1,700	19.70	2,448,000	0.38
7.05	0.77	1,725	20.28	2,484,000	0.39
7.15	0.80	1,750	20.87	2,520,000	0.40
7.25	0.82	1,775	21.47	2,556,000	0.41
7.35	0.84	1,800	22.08	2,592,000	0.42

DIAMETER TEN INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 1000 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
7.46	0.86	1,825	22.70	2,628,000	0.44
7.56	0.89	1,850	23.32	2,664,000	0.45
7.66	0.91	1,875	23.96	2,700,000	0.46
7.76	0.94	1,900	24.60	2,736,000	0.47
7.86	0.96	1,925	25.25	2,772,000	0.49
7.97	0.99	1,950	25.91	2,808,000	0.50
8.07	1.01	1,975	26.58	2,844,000	0.51
8.17	1.04	2,000	27.26	2,880,000	0.52
8.27	1.06	2,025	27.94	2,916,000	0.54
8.37	1.09	2,050	28.64	2,952,000	0.55
8.48	1.12	2,075	29.33	2,988,000	0.56
8.58	1.14	2,100	30.05	3,024,000	0.58
8.68	1.17	2,125	30.77	3,060,000	0.59
8.78	1.20	2,150	31.50	3,096,000	0.61
8.88	1.23	2,175	32.24	3,132,000	0.62
8.99	1.26	2,200	32.98	3,168,000	0.63
9.09	1.28	2,225	33.74	3,204,000	0.65
9.19	1.31	2,250	34.50	3,240,000	0.66
9.29	1.34	2,275	35.27	3,276,000	0.68
9.40	1.37	2,300	36.05	3,312,000	0.69
9.50	1.40	2,325	36.84	3,348,000	0.71
9.60	1.43	2,350	37.63	3,384,000	0.72
9.70	1.46	2,375	38.44	3,420,000	0.74
9.80	1.49	2,400	39.25	3,456,000	0.76

DIAMETER TEN INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 1000 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
9.91	1.53	2,425	40.07	3,492,000	0.77
10.01	1.56	2,450	40.90	3,528,000	0.79
10.11	1.59	2,475	41.74	3,564,000	0.80
10.21	1.62	2,500	42.59	3,600,000	0.82
10.31	1.65	2,525	43.45	3,636,000	0.84
10.42	1.69	2,550	44.33	3,672,000	0.85
10.52	1.72	2,575	45.21	3,708,000	0.87
10.62	1.75	2,600	46.07	3,744,000	0.89
10.72	1.79	2,625	46.96	3,780,000	0.90
10.83	1.82	2,650	47.86	3,816,000	0.92
10.93	1.86	2,675	48.76	3,852,000	0.94
11.03	1.89	2,700	49.68	3,888,000	0.96
11.13	1.93	2,725	50.60	3,924,000	0.97
11.23	1.96	2,750	51.54	3,960,000	0.99
11.34	2.00	2,775	52.48	3,996,000	1.01
11.44	2.03	2,800	53.43	4,032,000	1.03
11.54	2.07	2,825	54.39	4,068,000	1.05
11.64	2.11	2,850	55.35	4,104,000	1.06
11.74	2.14	2,875	56.33	4,140,000	1.08
11.85	2.18	2,900	57.31	4,176,000	1.10
11.95	2.22	2,925	58.30	4,212,000	1.12
12.05	2.26	2,950	59.30	4,248,000	1.14
12.15	2.30	2,975	60.31	4,284,000	1.16
12.26	2.34	3,000	61.33	4,320,000	1.18

DIAMETER TWELVE INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 1000 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
0.07	0.00	25	0.01	36,000	0.00
0.14	0.00	50	0.01	72,000	0.00
0.21	0.00	75	0.03	108,000	0.00
0.28	0.00	100	0.04	144,000	0.00
0.35	0.00	125	0.04	180,000	0.00
0.43	0.00	150	0.06	216,000	0.00
0.50	0.00	175	0.08	252,000	0.00
0.57	0.01	200	0.11	288,000	0.00
0.64	0.01	225	0.14	324,000	0.00
0.71	0.01	250	0.17	360,000	0.00
0.78	0.01	275	0.20	396,000	0.00
0.85	0.01	300	0.24	432,000	0.01
0.92	0.01	325	0.28	468,000	0.01
0.99	0.02	350	0.33	504,000	0 01
1.06	0.02	375	0.38	540,000	0.01
1.13	0.02	400	0.43	576,000	0.01
1.21	0.02	425	0.49	612,000	0.01
1.28	0.03	450	0.55	648,000	0.01
1.35	0.03	475	0.61	684,000	0.01
1.42	0.03	500	0.67	720,000	0.02
1.49	0.03	525	0.74	756,000	0.02
1.56	0.04	550	0.82	792,000	0.02
1.63	0.04	575	0.89	828,000	0.02
1.70	0.05	600	0.97	864,000	0.02

DIAMETER TWELVE INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 1000 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
1.77	0.05	625	1.05	900,000	0.03
1.84	0.05	650	1.14	936,000	0.03
1.91	0.06	675	1.23	972,000	0.03
1.99	0.06	700	1.32	1,008,000	0.03
2.06	0.07	725	1.42	1,044,000	0.03
2.13	0.07	750	1.52	1,080,000	0.04
2.20	0.08	775	1.62	1,116,000	0.04
2.27	0.08	800	1.73	1,152,000	0.04
2.34	0.09	825	1.84	1,188,000	0.04
2.41	0.09	850	1.95	1,224,000	0.05
2.48	0.10	875	2.07	1,260,000	0.05
2.55	0.10	900	2.19	1,296,000	0.05
2.62	0.11	925	2.31	1,332,000	0.05
2.69	0.11	950	2.44	1,368,000	0.06
2.77	0.12	975	2.56	1,404,000	0.06
2.84	0.13	1,000	2.70	1,440,000	0.06
2.91	0.13	1,025	2.83	1,476,000	0.07
2.98	0.14	1,050	2.97	1,512,000	0.07
3.05	0.14	1,075	3.12	1,548,000	0.07
3.12	0.15	1,100	3.26	1,584,000	0.08
3.19	0.16	1,125	3.41	1,620,000	0.08
3.26	0.17	1,150	3.57	1,656,000	0.08
3.33	0.17	1,175	3.72	1,692,000	0.08
3.40	0.18	1,200	3.88	1,728,000	0.09

DIAMETER TWELVE INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 1000 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
3.48	0.19	1,225	4.05	1,764,000	0.09
3.55	0.20	1,250	4.21	1,800,000	0.10
3.62	0.20	1,275	4.39	1,836,000	0.10
3.69	0.21	1,300	4.56	1,872,000	0.11
3.76	0.22	1,325	4.74	1,908,000	0.11
3.83	0.23	1,350	4.92	1,944,000	0.12
3.90	0.24	1,375	5.10	1,980,000	0.12
3.97	0.25	1,400	5.29	2,016,000	0.12
4.04	0.25	1,425	5.48	2,052,000	0.13
4.11	0.26	1,450	5.67	2,088,000	0.13
4.18	0.27	1,475	5.87	2,124,000	0.14
4.26	0.28	1,500	6.07	2,160,000	0.14
4.33	0.29	1,525	6.27	2,196,000	0.15
4.40	0.30	1,550	6.48	2,232,000	0.15
4.47	0.31	1,575	6.69	2,268,000	0.16
4.54	0.32	1,600	6.91	2,304,000	0.16
4.61	0.33	1,625	7.12	2,340,000	0.17
4.68	0.34	1,650	7.34	2,376,000	0.17
4.75	0.35	1,675	7.57	2,412,000	0.18
4.82	0.36	1,700	7.80	2,448,000	0.18
4.89	0.37	1,725	8.03	2,484,000	0.19
4.96	0.38	1,750	8.26	2,520,000	0.19
5.04	0.39	1,775	8.50	2,556,000	0.20
5.11	0.41	1,800	8.74	2,592,000	0.20

DIAMETER TWELVE INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 1000 Ft.	Discharge in U. S Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
5.18	0.42	1,825	8.98	2,628,000	0.21
5.25	0.43	1,850	9.23	2,664,000	0.22
5.32	0.44	1,875	9.48	2,700,000	0.22
5.39	0.45	1,900	9.74	2,736,000	0.23
5.46	0.46	1,925	9.99	2,772,000	0.23
5.53	0.48	1,950	10.26	2,808,000	0.24
5.60	0.49	1,975	10.52	2,844,000	0.25
5.67	0.50	2,000	10.79	2,880,000	0.25
5.74	0.51	2,025	11.06	2,916,000	0.26
5.82	0.53	2,050	11.34	2,952,000	0.27
5.89	0.54	2,075	11.61	2,988,000	0.27
5.96	0.55	2,100	11.90	3,024,000	0.28
6.03	0.57	2,125	12.18	3,060,000	0.29
6.10	0.58	2,150	12.47	3,096,000	0.29
6.17	0.59	2,175	12.76	3,132,000	0.30
6.24	0.61	2,200	13.06	3,168,000	0.31
6.31	0.62	2,225	13.35	3,204,000	0.31
6.38	0.63	2,250	13.65	3,240,000	0.32
6.45	0.65	2,275	13.96	3,276,000	0.33
6.52	0.66	2,300	14.27	3,312,000	0.33
6.60	0.68	2,325	14.58	3,348,000	0.34
6.67	0.69	2,350	14.90	3,384,000	0.35
6.74	0.71	2,375	15.22	3,420,000	0.36
6.81	0.72	2,400	15.54	3,456,000	0.36

DIAMETER TWELVE INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 1000 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
6.88	0.74	2,425	15.86	3,492,000	0.37
6.95	0.75	2,450	16.19	3,528,000	0.38
7.02	0.77	2,475	16.52	3,564,000	0.39
7.09	0.78	2,500	16.86	3,600,000	0.39
7.16	0.80	2,525	17.20	3,636,000	0.40
7.23	0.81	2,550	17.54	3,672,000	0.41
7.30	0.83	2,575	17.89	3,708,000	0.42
7.38	0.85	2,600	18.23	3,744,000	0.43
7.45	0.86	2,625	18.59	3,780,000	0.44
7.52	0.88	2,650	18.94	3,816,000	0.44
7.59	0.90	2,675	19.30	3,852,000	0.45
7.66	0.91	2,700	19.66	3,888,000	0.46
7.73	0.93	2,725	20.03	3,924,000	0.47
7.80	0.95	2,750	20.40	3,960,000	0.48
7.87	0.96	2,775	20.77	3,996,000	0.49
7.94	0.98	2,800	21.15	4,032,000	0.50
8.01	1.00	2,825	21.53	4,068,000	0.50
8.08	1.02	2,850	21.91	4,104,000	0.51
8.16	1.04	2,875	22.29	4,140,000	0.52
8.23	1.05	2,900	22.68	4,176,000	0.53
8.30	1.07	2,925	23.08	4,212,000	0.54
8.37	1.09	2,950	23.47	4,248,000	0.55
8.44	1.11	2,975	23.87	4,284,000	0.56
8.51	1.13	3,000	24.28	4,320,000	0.57

DIAMETER TWELVE INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 1000 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
8.58	1.14	3,025	24.68	4,356,000	0.58
8.65	1.16	3,050	25.09	4,392,000	0.59
8.72	1.18	3,075	25.51	4,428,000	0.60
8.79	1.20	3,100	25.92	4,464,000	0.61
8.86	1.22	3,125	26.34	4,500,000	0.62
8.94	1.24	3,150	26.76	4,536,000	0.63
9.01	1.26	3,175	27.19	4,572,000	0.64
9.08	1.28	3,200	27.62	4,608,000	0.65
9.15	1.30	3,225	28.05	4,644,000	0.66
9.22	1.32	3,250	28.49	4,680,000	0.67
9.29	1.34	3,275	28.93	4,716,000	0.68
9.36	1.36	3,300	29.37	4,752,000	0.69
9.43	1.38	3,325	29.82	4,788,000	0.70
9.50	1.40	3,350	30.27	4,824,000	0.71
9.57	1.43	3,375	30.72	4,860,000	0.72
9.65	1.45	3,400	31.18	4,896,000	0.73
9.72	1.47	3,425	31.64	4,932,000	0.74
9.79	1.49	3,450	32.10	4,968,000	0.75
9.86	1.51	3,475	32.57	5,004,000	0.76
9.93	1.53	3,500	33.04	5,040,000	0.77
10.00	1.56	3,525	33.56	5,076,000	0.79

DIAMETER SIXTEEN INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 1000 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
0.08	0.00	50	0.01	72,000	0.00
0.16	0.00	100	0.01	144,000	0.00
0.24	0.00	150	0.02	216,000	0.00
0.32	0.00	200	0.04	288,000	0.00
0.40	0.00	250	0.04	360,000	0.00
0.48	0.00	300	0.06	432,000	0.00
0.56	0.00	350	0.08	504,000	0.00
0.64	0.01	400	0.10	576,000	0.00
0.72	0.01	450	0.13	648,000	0.00
0.80	0.01	500	0 16	720,000	0.00
0.88	0.01	550	0.19	792,000	0.01
0.96	0.01	600	0.23	864,000	0.01
1.04	0.02	650	0.27	936,000	0.01
1.12	0.02	700	0.31	1,008,000	0.01
1.20	0.02	750	0.35	1,080,000	0.01
1.28	0.03	800	0.40	1,152,000	0.01
1.36	0.03	850	0.45	1,224,000	0.01
1.44	0.03	900	0.51	1,296,000	0.02
1.52	0.04	950	0.57	1,368,000	0.02
1.60	0.04	1,000	0.63	1,440,000	0.02
1.68	0.04	1,050	0.69	1,512,000	0.02
1.76	0 05	1,100	0.76	1,584,000	0.02
1.84	0.05	1,150	0.83	1,656,000	0.03
1.91	0.06	1,200	0.90	1,728,000	0.03

DIAMETER SIXTEEN INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 1000 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
1.99	0.06	1,250	0.98	1,800,000	0.03
2.07	0.07	1,300	1.06	1,872,000	0.03
2.15	0.07	1,350	1.15	1,944,000	0.04
2.23	0.08	1,400	1.23	2,016,000	0.04
2.31	0.08	1,450	1.32	2,088,000	0.04
2.39	0.09	1,500	1.41	2,160,000	0.04
2.47	0.10	1,550	1.51	2,232,000	0.05
2.55	0.10	1,600	1.61	2,304,000	0.05
2.63	0.11	1,650	1.71	2,376,000	0.05
2.71	0.11	1,700	1.81	2,448,000	0.06
2.79	0.12	1,750	1.92	2,520,000	0.06
2.87	0.13	1,800	2.03	2,592,000	0.06
2.95	0.14	1,850	2.15	2,664,000	0.07
3.03	0.14	1,900	2.27	2,736,000	0.07
3.11	0.15	1,950	2.39	2,808,000	0.08
3.19	0.16	2,000	2.51	2,880,000	0.08
3.27	0.17	2,050	2.64	2,952,000	0.08
3.35	0.17	2,100	2.77	3,024,000	0.09
3.43	0.18	2,150	2.90	3,096,000	0.09
3.51	0.19	2,200	3.04	3,168,000	0.10
3.59	0.20	2,250	3.18	3,240,000	0.10
3.67	0.21	2,300	3.32	3,312,000	0.11
3.75	0.22	2,350	3.47	3,384,000	0.11
3.83	0.23	2,400	3.62	3,456,000	0.12

DIAMETER SIXTEEN INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 1000 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
3.91	0.25	2,450	3.77	3,528,000	0.12
3.99	0.25	2,500	3.92	3,600,000	0.13
4.07	0.26	2,550	4.08	3,672,000	0.13
4.15	0.27	2,600	4.24	3,744,000	0.14
4.23	0.28	2,650	4.41	3,816,000	0.14
4.31	0.29	2,700	4.58	3,888,000	0.15
4.39	0.30	2,750	4.75	3,960,000	0.15
4.47	0.31	2,800	4.92	4,032,000	0.16
4.55	0.32	2,850	5.10	4,104,000	0.16
4.63	0.33	2,900	5.28	4,176,000	0.17
4.71	0.34	2,950	5.46	4,248,000	0.17
4.79	0.36	3,000	5.65	4,320,000	0.18
4.87	0.37	3,050	5.84	4,392,000	0.19
4.95	0.38	3,100	6.03	4,464,000	0.19
5.03	0.39	3,150	6.23	4,536,000	0.20
5.11	0.40	3,200	6.43	4,608,000	0 20
5.19	0.42	3,250	6.63	4,680,000	0.21
5.27	0.43	3,300	6.84	4,752,000	0.22
5.35	0.44	3,350	7.05	4,824,000	0.22
5.43	0.46	3,400	7.26	4,896,000	0.23
5.51	0.47	3,450	7.47	4,968,000	0.24
5.58	0.49	3,500	7.69	5,040,000	0.25
5.66	0.50	3,550	7.91	5,112,000	0.25
5.74	0.51	3,600	8.14	5,184,000	0.26

DIAMETER SIXTEEN INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 1000 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
5.82	0.53	3,650	8.36	5,256,000	0.27
5.90	0.54	3,700	8.59	5,328,000	0.27
5.98	0.56	3,750	8.83	5,400,000	0.28
6.06	0.57	3,800	9.07	5,472,000	0.29
6.14	0.59	3,850	9.30	5,544,000	0.30
6.22	0.60	3,900	9.55	5,616,000	0.30
6.30	0.62	3,950	9.80	5,688,000	0.31
6.38	0.63	4,000	10.05	5,760,000	0.32
6.46	0.65	4,050	10.30	5,832,000	0.33
6.54	0.67	4,100	10.55	5,904,000	0.34
6.62	0.68	4,150	10.81	5,976,000	0.34
6.70	0.70	4,200	11.07	6,048,000	0.35
6.78	0.72	4,250	11.34	6,120,000	0.36
6.86	0.73	4,300	11.61	6,192,000	0.37
6.94	0.75	4,350	11.88	6,264,000	0.38
7.02	0.77	4,400	12.15	6,336,000	0.39
7.10	0.78	4,450	12.41	6,408,000	0.40
7.18	0.80	4,500	12.71	6,480,000	0.40
7.26	0.82	4,550	13.00	6,552,000	0.41
7.34	0.84	4,600	13.28	6,624,000	0.42
7.42	0.86	4,650	13.57	6,696,000	0.43
7.50	0.88	4,700	13.87	6,768,000	0.44
7.58	0.89	4,750	14.16	6,840,000	0.45
7.66	0.91	4,800	14.46	6,912,000	0.46

DIAMETER SIXTEEN INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 1000 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
7.74	0.93	4,850	14.77	6,984,000	0.47
7.82	0.95	4,900	15.07	7,056,000	0.48
7.90	0.97	4,950	15.38	7,128,000	0.49
7.98	0.99	5,000	15.69	7,200,000	0.50
8.06	1.01	5,050	16.01	7,272,000	0.51
8.14	1.03	5,100	16.33	7,344,000	0.52
8.22	1.05	5,150	16.65	7,416,000	0.53
8.30	1.07	5,200	16.97	7,488,000	0.54
8.38	1.09	5,250	17.30	7,560,000	0.55
8.46	1.11	5,300	17.63	7,632,000	0.56
8.54	1.13	5,350	17.97	7,704,000	0.57
8.62	1.15	5,400	18.31	7,776,000	0.58
8.70	1.18	5,450	18.65	7,848,000	0.59
8.78	1.20	5,500	18.99	7,920,000	0.61
8.86	1.22	5,550	19.34	7,992,000	0.62
8.94	1.24	5,600	19.69	8,064,000	0.63

DIAMETER TWENTY INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 1000 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
0.05	0.00	50	0.00	72,000	0.00
0.10	0.00	100	0.01	144,000	0.00
0.15	0.00	150	0.01	216,000	0.00
0.20	0.00	200	0.01	288,000	0.00
0.26	0.00	250	0.02	360,000	0.00
0.31	0.00	300	0.03	432,000	0.00
0.36	0.00	350	0.03	504,000	0.00
0.41	0.00	400	0.03	576,000	0.00
0.46	0.00	450	0.04	648,000	0.00
0.51	0.00	500	0.05	720,000	0.00
0.56	0.00	550	0.06	792,000	0.00
0.61	0.01	600	0.07	864,000	0.00
0.66	0.01	650	0.09	936,000	0.00
0.71	0.01	700	0.10	1,008,000	0.00
0.77	0.01	750	0.11	1,080,000	0.00
0.82	0.01	800	0.13	1,152,000	0.01
0.87	0.01	850	0.15	1,224,000	0.01
0.92	0.01	900	0.16	1,296,000	0.01
0.97	0.01	950	0.18	1,368,000	0.01
1.02	0.02	1,000	0.20	1,440,000	0.01
1.07	0.02	1,050	0 22	1,512,000	0.01
1.12	0.02	1,100	0.25	1,584,000	0.01
1.17	0.02	1,150	0.27	1,656,000	0.01
1.23	0.02	1,200	0.29	1,728,000	0.01

DIAMETER TWENTY INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 1000 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
1.28	0.03	1,250	0.32	1,800,000	0.01
1.33	0.03	1,300	0.34	1,872,000	0.01
1.38	0.03	1,350	0.37	1,944,000	0.01
1.43	0.03	1,400	0.40	2,016,000	0.02
1.48	0.03	1,450	0.43	2,088,000	0.02
1.53	0.04	1,500	0.46	2,160,000	0.02
1.58	0.04	1,550	0.49	2,232,000	0.02
1.63	0.04	1,600	0.52	2,304,000	0.02
1.69	0.04	1,650	0.55	2,376,000	0.02
1.74	0.05	1,700	0.59	2,448,000	0.02
1.79	0.05	1,750	0.62	2,520,000	0.03
1.84	0.05	1,800	0.66	2,592,000	0.03
1.89	0.06	1,850	0.70	2,664,000	0.03
1.94	0.06	1,900	0.73	2,736,000	0.03
1.99	0.06	1,950	0.77	2,808,000	0.03
2.04	0.06	2,000	0.81	2,880,000	0.03
2.09	0.07	2,050	0.85	2,952,000	0.03
2.14	0.07	2,100	0.90	3,024,000	0.04
2.20	0.08	2,150	0.94	3,096,000	0.04
2.25	0.08	2,200	0.98	3,168,000	0.04
2.30	0.08	2,250	1.03	3,240,000	0.04
2.35	0.09	2,300	1.07	3,312,000	0.04
2.40	0.09	2,350	1.12	3,384,000	0.05
2.45	0.09	2,400	1.17	3,456,000	0.05

DIAMETER TWENTY INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 1000 Ft.	Discharge in U. S Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
2.50	0.10	2,450	1.22	3,528,000	0.05
2.55	0.10	2,500	1.27	3,600,000	0.05
2.60	0.11	2,550	1.32	3,672,000	0.05
2.66	0.11	2,600	1.37	3,744,000	0.06
2.71	0.11	2,650	1.43	3,816,000	0.06
2.76	0.12	2,700	1.48	3,888,000	0.06
2.81	0.12	2,750	1.54	3,960,000	0.06
2.86	0.13	2,800	1.59	4,032,000	0.06
2.91	0.13	2,850	1.65	4,104,000	0.07
2.96	0.14	2,900	1.71	4,176,000	0.07
3.01	0.14	2,950	1.77	4,248,000	0.07
3.06	0.15	3,000	1.83	4,320,000	0.07
3.11	0.15	3,050	1.89	4,392,000	0.08
3.17	0.16	3,100	1.95	4,464,000	0.08
3.22	0.16	3,150	2.02	4,536,000	0.08
3.27	0.17	3,200	2.08	4,608,000	0.08
3.32	0.17	3,250	2.15	4,680,000	0.09
3.37	0.18	3,300	2.21	4,752,000	0.09
3.42	0.18	3,350	2.28	4,824,000	0.09
3.47	0.19	3,400	2.35	4,896,000	0.09
3.52	0.19	3,450	2.42	4,968,000	0.10
3.57	0.20	3,500	2.49	5,040,000	0.10
3.63	0.20	3,550	2.56	5,112,000	0.10
3.68	0.21	3,600	2.63	5,184,000	0.11

DIAMETER TWENTY INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 1000 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
3.73	0.22	3,650	2.71	5,256,000	0.11
3.78	0.22	3,700	2.78	5,328,000	0.11
3.83	0.23	3,750	2.86	5,400,000	0.12
3.88	0.23	3,800	2.93	5,472,000	0.12
3.93	0.24	3,850	3.01	5,544,000	0.12
3.98	0.25	3,900	3.09	5,616,000	0.12
4.03	0.25	3,950	3.17	5,688,000	0.13
4.09	0.26	4,000	3.25	5,760,000	0.13
4.14	0.27	4,050	3.33	5,832,000	0.13
4.19	0.27	4,100	3.42	5,904,000	0.14
4.24	0.28	4,150	3.50	5,976,000	0.14
4.29	0.29	4,200	3.58	6,048,000	0.14
4.34	0.29	4,250	3.67	6,120,000	0.15
4.39	0.30	4,300	3.76	6,192,000	0.15
4.44	0.31	4,350	3.84	6,264,000	0.15
4.49	0.31	4,400	3.93	6,336,000	0.16
4.54	0.32	4,450	4.02	6,408,000	0.16
4.60	0.33	4,500	4.11	6,480,000	0.17
4.65	0.34	4,550	4.21	6,552,000	0.17
4.70	0.34	4,600	4.30	6,624,000	0.17
4.75	0.35	4,650	4.39	6,696,000	0.18
4.80	0.36	4,700	4.49	6,768 000	0.18
4.85	0.37	4,750	4.58	6,840,000	0.18
4.90	0.37	4,800	4.68	6,912,000	0.19

DIAMETER TWENTY INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 1000 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
4.95	0.38	4,850	4.78	6,984,000	0.19
5.00	0.39	4,900	4.88	7,056,000	0.20
5.06	0.40	4,950	4.98	7,128,000	0.20
5.11	0.41	5,000	5.08	7,200,000	0.20
5.16	0.41	5,050	5.18	7,272,000	0.21
5.21	0.42	5,100	5.28	7,344,000	0.21
5.26	0.43	5,150	5.39	7,416,000	0.22
5.31	0.44	5,200	5.49	7,488,000	0.22
5.36	0.45	5,250	5.60	7,560,000	0.23
5.41	0.46	5,300	5.71	7,632,000	0.23
5.46	0.46	5,350	5.82	7,704,000	0.23
5.51	0.47	5,400	5.92	7,776,000	0.24
5.57	0.48	5,450	6.04	7,848,000	0.24
5.62	0.49	5,500	6.15	7,920,000	0.25
5.67	0.50	5,550	6.26	7,992,000	0.25
5.72	0.51	5,600	6.37	8,064,000	0.26
5.77	0.52	5,650	6.49	8,136,000	0.26
5.82	0.53	5,700	6.60	8,208,000	0.27
5.87	0.54	5,750	6.72	8,280,000	0.27
5.92	0.55	5,800	6.84	8,352,000	0.28
5.97	0.55	5,850	6.95	8,424,000	0.28
6.03	0.56	5,900	7.07	8,496,000	0.29
6.08	0.57	5,950	7.19	8,568,000	0.29
6.13	0.58	6,000	7.31	8,640,000	0.29

DIAMETER TWENTY INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 1000 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
6.18	0.59	6,050	7.44	8,712,000	0.30
6.23	0.60	6,100	7.56	8,784,000	0.30
6.28	0.61	6,150	7.68	8,856,000	0.31
6.33	0.62	6,200	7.81	8,928,000	0.31
6.38	0.63	6,250	7.94	9,000,000	0.32
6.43	0.64	6,300	8.06	9,072,000	0.32
6.48	0.65	6,350	8.19	9,144,000	0.33
6.54	0.66	6,400	8.32	9,216,000	0.34
6.59	0.67	6,450	8.45	9,288,000	0.34
6.64	0.69	6,500	8.58	9,360,000	0.35
6.69	0.70	6,550	8.72	9,432,000	0.35
6.74	0.71	6,600	8.85	9,504,000	0.36
6.79	0.72	6,650	8.99	9,576,000	0.36
6.84	0.73	6,700	9.12	9,648,000	0.37
6.89	0.74	6,750	9.26	9,720,000	0.37
6.94	0.75	6,800	9.40	9,792,000	0.38
7.00	0.76	6,850	9.53	9,864,000	0.38
7.05	0.77	6,900	9.67	9,936,000	0.39
7.10	0.78	6,950	9.81	10,008,000	0.40
7.15	0.79	7,000	9.96	10,080,000	0.40
7.20	0.81	7,050	10 10	10,152,000	0.41
7.25	0.82	7,100	10.24	10,224,000	0.41
7.30	0.83	7,150	10.39	10,296,000	0.42
7.35	0.84	7,200	10.53	10,368,000	0.42

DIAMETER TWENTY INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 1000 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
7.40	0.85	7,250	10.68	10,440,000	0.43
7.46	0.86	7,300	10.83	10,512,000	0.44
7.51	0.88	7,350	10.98	10,584,000	0.44
7.56	0.89	7,400	11.13	10,656,000	0.45
7.61	0.90	7,450	11.28	10,728,000	0.45
7.66	0.91	7,500	11.43	10,800,000	0.46

DIAMETER TWENTY-FOUR INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 1000 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
0.04	0.00	50	0.00	72,000	0.00
0.07	0.00	100	0.00	144,000	0.00
0.11	0.00	150	0.01	216,000	0.00
0.14	0.00	200	0.01	288,000	0.00
0.18	0.00	250	0.01	360,000	0.00
0.21	0.00	300	0.01	432,000	0.00
0.25	0.00	350	0.02	504,000	0.00
0.28	0.00	400	0.02	576,000	0.00
0.32	0.00	450	0.02	648,000	0.00
0.35	0.00	500	0.02	720,000	0.00
0.39	0.00	550	0.02	792,000	0.00
0.43	0.00	600	0.03	864,000	0.00
0.46	0.00	650	0.03	936,000	0.00
0.50	0.00	700	0.04	1,008,000	0.00
0.53	0.00	750	0.05	1,080,000	0.00
0.57	0.01	800	0.05	1,152,000	0.00
0.60	0.01	850	0.06	1,224,000	0.00
0.64	0.01	900	0.07	1,296,000	0.00
0.67	0.01	950	0.07	1,368,000	0.00
0.71	0.01	1,000	0.08	1,440,000	0.00
0.74	0.01	1,050	0.09	1,512,000	0.00
0.78	0.01	1,100	0.10	1,584,000	0.00
0.82	0.01	1,150	0.11	1,656,000	0.01
0.85	0.01	1,200	0.12	1,728,000	0.01

DIAMETER TWENTY-FOUR INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 1000 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
0.89	0.01	1,250	0.13	1,800,000	0.01
0.92	0.01	1,300	0.14	1,872,000	0.01
0.96	0.01	1,350	0.15	1,944,000	0.01
0.99	0.02	1,400	0.16	2,016,000	0.01
1.03	0.02	1,450	0.17	2,088,000	0.01
1.06	0.02	1,500	0.18	2,160,000	0.01
1.10	0.02	1,550	0.19	2,232,000	0.01
1.13	0.02	1,600	0.21	2,304,000	0.01
1.17	0.02	1,650	0.22	2,376,000	0.01
1.21	0.02	1,700	0.23	2,448,000	0.01
1.24	0.02	1,750	0.25	2,520,000	0.01
1.28	0.03	1,800	0.26	2,592,000	0.01
1.31	0.03	1,850	0.28	2,664,000	0.01
1.35	0.03	1,900	0.29	2,736,000	0.01
1.38	0.03	1,950	0.31	2,808,000	0.02
1.42	0.03	2,000	0.32	2,880,000	0.02
1.45	0.03	2,050	0.34	2,952,000	0.02
1.49	0.03	2,100	0.36	3,024,000	0.02
1.52	0.04	2,150	0.37	3,096,000	0.02
1.56	0.04	2,200	0.39	3,168,000	0.02
1.60	0.04	2,250	0.41	3,240,000	0.02
1.63	0.04	2,300	0.43	3,312,000	0.02
1.67	0.04	2,350	0.45	3,384,000	0.02
1.70	0.05	2,400	0.47	3,456,000	0.02

DIAMETER TWENTY-FOUR INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 1000 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
1.74	0.05	2,450	0.49	3,528,000	0.02
1.77	0.05	2,500	0.51	3,600,000	0.02
1.81	0.05	2,550	0.53	3,672,000	0.03
1.84	0.05	2,600	0.55	3,744,000	0.03
1.88	0.05	2,650	0.57	3,816,000	0.03
1.91	0.06	2,700	0.59	3,888,000	0.03
1.95	0.06	2,750	0.61	3,960,000	0.03
1.99	0.06	2,800	0.64	4,032,000	0.03
2.02	0.06	2,850	0.66	4,104,000	0.03
2.06	0.07	2,900	0.68	4,176,000	0.03
2.09	0.07	2,950	0.70	4,248,000	0.03
2.13	0.07	3,000	0.73	4,320,000	0.04
2.16	0.07	3,050	0.75	4,392,000	0.04
2.20	0.08	3,100	0.78	4,464,000	0.04
2.23	0.08	3,150	0.80	4,536,000	0.04
2.27	0.08	3,200	0.83	4,608,000	0.04
2.30	0.08	3,250	0.86	4,680,000	0.04
2.34	0.09	3,300	0.88	4,752,000	0.04
2.38	0.09	3,350	0.91	4,824,000	0.04
2.41	0.09	3,400	0.94	4,896,000	0.05
2.45	0.09	3,450	0.97	4,968,000	0.05
2.48	0.10	3,500	0.99	5,040,000	0.05
2.52	0.10	3,550	1.02	5,112,000	0.05
2.55	0.10	3,600	1.05	5,184,000	0.05

DIAMETER TWENTY-FOUR INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 1000 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
2.59	0.10	3,650	1.08	5,256,000	0.05
2.62	0.11	3,700	1.11	5,328,000	0.05
2.66	0.11	3,750	1.14	5,400,000	0.06
2.69	0.11	3,800	1.17	5,472,000	0.06
2.73	0.12	3,850	1.20	5,544,000	0.06
2.77	0.12	3,900	1.23	5,616,000	0.06
2.80	0.12	3,950	1.26	5,688,000	0.06
2.84	0.13	4,000	1.30	5,760,000	0.06
2.87	0.13	4,050	1.33	5,832,000	0.06
2.91	0.13	4,100	1.36	5,904,000	0.07
2.94	0.13	4,150	1.40	5,976,000	0.07
2.98	0.14	4,200	1.43	6,048,000	0.07
3.01	0.14	4,250	1.46	6,120,000	0.07
3.05	0.14	4,300	1.50	6,192,000	0.07
3.09	0.15	4,350	1.53	6,264,000	0.07
3.12	0.15	4,400	1.57	6,336,000	0.08
3.16	0.15	4,450	1.60	6,408,000	0.08
3.19	0.16	4,500	1.64	6,480,000	0.08
3.23	0.16	4,550	1.68	6,552,000	0.08
3.26	0.17	4,600	1.71	6,624,000	0.08
3.30	0.17	4,650	1.75	6,696,000	0.09
3.33	0.17	4,700	1.79	6,768,000	0.09
3.37	0.18	4,750	1.83	6,840,000	0.09
3.40	0.18	4,800	1.87	6,912,000	0.09

DIAMETER TWENTY-FOUR INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 1000 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
3.44	0.18	4,850	1.91	6,984,000	0.09
3.48	0.19	4,900	1.94	7,056,000	0.09
3.51	0.19	4,950	1.98	7,128,000	0.10
3.55	0.20	5,000	2.03	7,200,000	0.10
3.58	0.20	5,050	2.07	7,272,000	0.10
3.62	0.20	5,100	2.11	7,344,000	0.10
3.65	0.21	5,150	2.15	7,416,000	0.10
3.69	0.21	5,200	2.19	7,488,000	0.11
3.72	0.22	5,250	2.23	7,560,000	0.11
3.76	0.22	5,300	2.28	7,632,000	0.11
3.79	0.22	5,350	2.32	7,704,000	0.11
3.83	0.23	5,400	2.36	7,776,000	0.12
3.87	0.23	5,450	2.41	7,848,000	0.12
3.90	0.24	5,500	2.45	7,920,000	0.12
3.94	0.24	5,550	2.50	7,992,000	0.12
3.97	0.25	5,600	2.54	8,064,000	0.12
4.01	0.25	5,650	2.59	8,136,000	0.13
4.04	0.25	5,700	2.63	8,208,000	0.13
4.08	0.26	5,750	2.68	8,280,000	0.13
4.11	0.26	5,800	2.72	8,352,000	0.13
4.15	0.27	5,850	2.77	8,424,000	0.14
4.18	0.27	5,900	2.82	8,496,000	0.14
4.22	0.28	5,950	2.87	8,568,000	0.14
4.26	0.28	6,000	2.92	8,640,000	0.14

DIAMETER TWENTY-FOUR INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 1000 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
4.29	0.29	6,050	2.96	8,712,000	0.14
4.33	0.29	6,100	3.01	8,784,000	0.15
4.36	0.30	6,150	3.06	8,856,000	0.15
4.40	0.30	6,200	3.11	8,928,000	0.15
4.43	0.31	6,250	3.16	9,000,000	0.15
4.47	0.31	6,300	3.22	9,072,000	0.16
4.50	0.32	6,350	3.27	9,144,000	0.16
4.54	0.32	6,400	3.32	9,216,000	0.16
4.57	0.33	6,450	3.37	9,288,000	0.16
4.61	0.33	6,500	3.42	9,360,000	0.17
4.65	0.34	6,550	3.48	9,432,000	0.17
4.68	0.34	6,600	3.53	9,504,000	0.17
4.72	0.35	6,650	3.58	9,576,000	0.17
4.75	0.35	6,700	3.64	9,648,000	0.18
4.79	0.36	6,750	3.69	9,720,000	0.18
4.82	0.36	6,800	3.75	9,792,000	0.18
4.86	0.37	6,850	3.80	9,864,000	0.19
4.89	0.37	6,900	3.86	9,936,000	0.19
4.93	0.38	6,950	3.91	10,008,000	0.19
4.96	0.38	7,000	3.97	10,080,000	0.19
5.00	0.39	7,050	4 03	10,152,000	0.20
5.04	0.39	7,100	4.08	10,224,000	0.20
5.07	0.40	7,150	4.14	10,296,000	0.20
5.11	0.41	7,200	4.20	10,368,000	0.20

DIAMETER TWENTY-FOUR INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 1000 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
5.14	0.41	7,250	4.26	10,440,000	0.21
5.18	0.42	7,300	4.32	10,512,000	0.21
5.21	0.42	7,350	4.38	10,584,000	0.21
5.25	0.43	7,400	4.44	10,656,000	0.22
5.28	0.43	7,450	4.50	10,728,000	0.22
5.32	0.44	7,500	4.56	10,800,000	0.22
5.35	0.45	7,550	4.62	10,872,000	0.23
5.39	0.45	7,600	4.68	10,944,000	0.23
5.43	0.46	7,650	4.74	11,016,000	0.23
5.46	0.46	7,700	4.80	11,088,000	0.23
5.50	0.47	7,750	4.87	11,160,000	0.24
5.53	0.48	7,800	4.93	11,232,000	0.24
5.57	0.48	7,850	4.99	11,304,000	0.24
5.60	0.49	7,900	5.06	11,376,000	0.25
5.64	0.49	7,950	5.12	11,448,000	0.25
5.67	0.50	8,000	5.18	11,520,000	0.25
5.71	0.51	8,050	5.25	11,592,000	0.26
5.74	0.51	8,100	5.32	11,664,000	0.26
5.78	0.52	8,150	5.38	11,736,000	0.26
5.82	0.53	8,200	5.45	11,808,000	0.27
5.85	0.53	8,250	5.51	11,880,000	0.27
5.89	0.54	8,300	5.58	11,952,000	0.27
5.92	0.55	8,350	5.65	12,024,000	0.28
5.96	0.55	8,400	5.72	12,096,000	0.28

DIAMETER TWENTY-FOUR INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 1000 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
5.99	0.56	8,450	5.78	12,168,000	0.28
6.03	0.56	8,500	5.85	12,240,000	0.29
6.06	0.57	8,550	5.92	12,312,000	0.29
6.10	0.58	8,600	5.99	12,384,000	0.29
6.13	0.59	8,650	6.06	12,456,000	0.30
6.17	0.59	8,700	6.13	12,528,000	0.30
6.21	0.60	8,750	6.20	12,600,000	0.30
6.24	0.61	8,800	6.27	12,672,000	0.31
6.28	0.61	8,850	6.34	12,744,000	0.31
6.31	0.62	8,900	6.42	12,816,000	0.31
6.35	0.63	8,950	6.49	12,888,000	0.32
6.38	0.63	9,000	6.56	12,960,000	0.32
6.42	0.64	9,050	6.63	13,032,000	0.32
6.45	0.65	9,100	6.71	13,104,000	0.33
6.49	0.65	9,150	6.78	13,176,000	0.33
6.52	0.66	9,200	6.86	13,248,000	0.33
6.56	0.67	9,250	6.93	13,320,000	0.34
6.60	0.68	9,300	7.01	13,392,000	0.34
6.63	0.68	9,350	7.08	13,464,000	0.35
6.67	0.69	9,400	7.16	13,536,000	0.35
6.70	0.70	9,450	7.23	13,608,000	0.35
6.74	0.71	9,500	7.31	13,680,000	0.36
6.77	0.71	9,550	7.39	13,752,000	0.36
6.81	0.72	9,600	7.47	13,824,000	0.36

DIAMETER THIRTY INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 1000 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
0.05	0.00	100	0.00	144,000	0.00
0.09	0.00	200	0.00	288,000	0.00
0.14	0.00	300	0.01	432,000	0.00
0.18	0.00	400	0.01	576,000	0.00
0.23	0.00	500	0.01	720,000	0.00
0.27	0.00	600	0.02	864,000	0.00
0.32	0.00	700	0.02	1,008,000	0.00
0.36	0.00	800	0.02	1,152,000	0.00
0.41	0.00	900	0.02	1,296,000	0.00
0.45	0.00	1,000	0.03	1,440,000	0.00
0.50	0.00	1,100	0.03	1,584,000	0.00
0.54	0.00	1,200	0.04	1,728,000	0.00
0.59	0.01	1,300	0.04	1,872,000	0.00
0.64	0.01	1,400	0.05	2,016,000	0.00
0.68	0.01	1,500	0.06	2,160,000	0.00
0.73	0.01	1,600	0.07	2,304,000	0.00
0.77	0.01	1,700	0.08	2,448,000	0.00
0.82	0.01	1,800	0.09	2,592,000	0.01
0.86	0.01	1,900	0.10	2,736,000	0.01
0.91	0.01	2,000	0.11	2,880,000	0.01
0.95	0.01	2,100	0.12	3,024,000	0.01
1.00	0.02	2,200	0.13	3,168,000	0.01
1.04	0.02	2,300	0.14	3,312,000	0.01
1.09	0.02	2,400	0.15	3,456,000	0.01

DIAMETER THIRTY INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 1000 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
1.13	0.02	2,500	0.16	3,600,000	0.01
1.18	0.02	2,600	0.18	3,744,000	0.01
1.23	0.02	2,700	0.19	3,888,000	0.01
1.27	0.03	2,800	0.21	4,032,000	0.01
1.32	0.03	2,900	0.22	4,176,000	0.01
1.36	0.03	3,000	0.24	4,320,000	0.01
1.41	0.03	3,100	0.25	4,464,000	0.02
1.45	0.03	3,200	0.27	4,608,000	0.02
1.50	0.03	3,300	0.29	4,752,000	0.02
1.54	0.04	3,400	0.30	4,896,000	0.02
1.59	0.04	3,500	0.32	5,040,000	0.02
1.63	0.04	3,600	0.34	5,184,000	0.02
1.68	0.04	3,700	0.36	5,328,000	0.02
1.72	0.05	3,800	0.38	5,472,000	0.02
1.77	0.05	3,900	0.40	5,616,000	0.02
1.82	0.05	4,000	0.42	5,760,000	0.03
1.86	0.05	4,100	0.44	5,904,000	0.03
1.91	0.06	4,200	0.46	6,048,000	0.03
1.95	0.06	4,300	0.49	6,192,000	0.03
2.00	0.06	4,400	0.51	6,336,000	0.03
2.04	0.06	4,500	0.53	6,480,000	0.03
2.09	0.07	4,600	0.56	6,624,000	0.03
2.13	0.07	4,700	0.58	6,768,000	0.04
2.18	0.07	4,800	0.61	6,912,000	0.04

DIAMETER THIRTY INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 1000 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
2.22	0.08	4,900	0.63	7,056,000	0.04
2.27	0.08	5,000	0.66	7,200,000	0.04
2.31	0.08	5,100	0.69	7,344,000	0.04
2.36	0.09	5,200	0.71	7,488,000	0.04
2.41	0.09	5,300	0.74	7,632,000	0.05
2.45	0.09	5,400	0.77	7,776,000	0.05
2.50	0.10	5,500	0.80	7,920,000	0.05
2.54	0.10	5,600	0.83	8,064,000	0.05
2.59	0.10	5,700	0.86	8,208,000	0.05
2.63	0.11	5,800	0.89	8,352,000	0.05
2.68	0.11	5,900	0.92	8,496,000	0.06
2.72	0.12	6,000	0.95	8,640,000	0.06
2.77	0.12	6,100	0.98	8,784,000	0.06
2.81	0.12	6,200	1.01	8,928,000	0.06
2.86	0.13	6,300	1.05	9,072,000	0.06
2.90	0.13	6,400	1.08	9,216,000	0.07
2.95	0.14	6,500	1.11	9,360,000	0.07
3.00	0.14	6,600	1.15	9,504,000	0.07
3.04	0.14	6,700	1.18	9,648,000	0.07
3.09	0.15	6,800	1.22	9,792,000	0.07
3.13	0.15	6,900	1.25	9,936,000	0.08
3.18	0.16	7,000	1.29	10,080,000	0.08
3.22	0.16	7,100	1.33	10,224,000	0.08
3.27	0.17	7,200	1.37	10,368,000	0.08

DIAMETER THIRTY INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 1000 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
3.31	0.17	7,300	1.40	10,512,000	0.09
3.36	0.18	7,400	1.44	10,656,000	0.09
3.40	0.18	7,500	1.48	10,800,000	0.09
3.45	0.18	7,600	1.52	10,944,000	0.09
3.49	0.19	7,700	1.56	11,088,000	0.10
3.54	0.19	7,800	1.60	11,232,000	0.10
3.59	0.20	7,900	1.64	11,376,000	0.10
3.63	0.20	8,000	1.69	11,520,000	0.10
3.68	0.21	8,100	1.73	11,664,000	0.11
3.72	0.22	8,200	1.77	11,808,000	0.11
3.77	0.22	8,300	1.81	11,952,000	0.11
3.81	0.23	8,400	1.86	12,096,000	0.11
3.86	0.23	8,500	1.90	12,240,000	0.12
3.90	0.24	8,600	1.95	12,384,000	0.12
3.95	0.24	8,700	1.99	12,528,000	0.12
3.99	0.25	8,800	2.04	12,672,000	0.13
4.04	0.25	8,900	2.09	12,816,000	0.13
4.09	0.26	9,000	2.13	12,960,000	0.13
4.13	0.27	9,100	2.18	13,104,000	0.13
4.18	0.27	9,200	2.23	13,248,000	0.14
4.22	0.28	9,300	2.28	13,392,000	0.14
4.27	0.28	9,400	2.33	13,536,000	0.14
4.31	0.29	9,500	2.38	13,680,000	0.15
4.36	0.30	9,600	2.43	13,824,000	0.15

DIAMETER THIRTY INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 1000 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
4.40	0.30	9,700	2.48	13,968,000	0.15
4.45	0.31	9,800	2.53	14,112,000	0.16
4.49	0.31	9,900	2.58	14,256,000	0.16
4.54	0.32	10,000	2.63	14,400,000	0.16
4.58	0.33	10,100	2.69	14,544,000	0.16
4.63	0.33	10,200	2.74	14,688,000	0.17
4.68	0.34	10,300	2.79	14,832,000	0.17
4.72	0.35	10,400	2.85	14,976,000	0.17
4.77	0.35	10,500	2.90	15,120,000	0.18
4.81	0.36	10,600	2.96	15,264,000	0.18
4.86	0.37	10,700	3.02	15,408,000	0.19
4.90	0.37	10,800	3.07	15,552,000	0.19
4.95	0.38	10,900	3.13	15,696,000	0.19
4.99	0.39	11,000	3.19	15,840,000	0.20
5.04	0.39	11,100	3.25	15,984,000	0.20
5.08	0.40	11,200	3.30	16,128,000	0.20
5.13	0.41	11,300	3.36	16,272,000	0.21
5.17	0.42	11,400	3.42	16,416,000	0.21
5.22	0.42	11,500	3.48	16,560,000	0.21
5.27	0.43	11,600	3.54	16,704,000	0.22
5.31	0.44	11,700	3.61	16,848,000	0.22
5.36	0.45	11,800	3.67	16,992,000	0.23
5.40	0.45	11,900	3.73	17,136,000	0.23
5.45	0.46	12,000	3.79	17,280,000	0.23

DIAMETER THIRTY INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 1000 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
5.49	0.47	12,100	3.86	17,424,000	0.24
5.54	0.48	12,200	3.92	17,568,000	0.24
5.58	0.48	12,300	3.98	17,712,000	0.24
5.63	0.49	12,400	4.05	17,856,000	0.25
5.67	0.50	12,500	4.12	18,000,000	0.25
5.72	0.51	12,600	4.18	18,144,000	0.26
5.76	0.52	12,700	4.25	18,288,000	0.26
5.81	0.52	12,800	4.32	18,432,000	0.26
5.86	0.53	12,900	4.38	18,576,000	0.27
5.90	0.54	13,000	4.45	18,720,000	0.27
5.95	0.55	13,100	4.52	18,864,000	0.28
5.99	0.56	13,200	4.59	19,008,000	0.28
6.04	0.57	13,300	4.66	19,152,000	0.29
6.08	0.58	13,400	4.73	19,296,000	0.29
6.13	0.58	13,500	4.80	19,440,000	0.29
6.17	0.59	13,600	4.87	19,584,000	0.30
6.22	0.60	13,700	4.94	19,728,000	0.30
6.26	0.61	13,800	5.02	19,872,000	0.31
6.31	0.62	13,900	5.09	20,016,000	0.31
6.35	0.63	14,000	5.16	20,160,000	0.32
6.40	0.64	14,100	5.24	20,304,000	0.32
6.45	0.65	14,200	5.31	20,448,000	0.33
6.49	0.65	14,300	5.39	20,592,000	0.33

DIAMETER THIRTY-SIX INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 1000 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
0.03	0.00	100	0.00	144,000	0.00
0.06	0.00	200	0.00	288,000	0.00
0.09	0.00	300	0.00	432,000	0.00
0.13	0.00	400	0.00	576,000	0.00
0.16	0.00	500	0.01	720,000	0.00
0.19	0.00	600	0.01	864,000	0.00
0.22	0.00	700	0.01	1,008,000	0.00
0.25	0.00	800	0.01	1,152,000	0.00
0.28	0.00	900	0.01	1,296,000	0.00
0.32	0.00	1,000	0.02	1,440,000	0.00
0.35	0.00	1,100	0.02	1,584,000	0.00
0.38	0.00	1,200	0.02	1,728,000	0.00
0.41	0.00	1,300	0.02	1,872,000	0.00
0.44	0.00	1,400	0.02	2,016,000	0.00
0.47	0.00	1,500	0.02	2,160,000	0.00
0.50	0.00	1,600	0.03	2,304,000	0.00
0.54	0.00	1,700	0.03	2,448,000	0.00
0.57	0.00	1,800	0.03	2,592,000	0.00
0.60	0.01	1,900	0.04	2,736,000	0.00
0.63	0.01	2,000	0.04	2,880,000	0.00
0.66	0.01	2,100	0.05	3,024,000	0.00
0.69	0.01	2,200	0.05	3,168,000	0.00
0.72	0.01	2,300	0.06	3,312,000	0.00
0.76	0.01	2,400	0.06	3,456,000	0.00

DIAMETER THIRTY-SIX INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 1000 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
0.79	0.01	2,500	0.07	3,600,000	0.00
0.82	0.01	2,600	0.07	3,744,000	0.01
0.85	0.01	2,700	0.08	3,888,000	0.01
0.88	0.01	2,800	0.08	4,032,000	0.01
0.91	0.01	2,900	0.09	4,176,000	0.01
0.95	0.01	3,000	0.09	4,320,000	0.01
0.98	0.01	3,100	0.10	4,464,000	0.01
1.01	0.02	3,200	0.11	4,608,000	0.01
1.04	0.02	3,300	0.11	4,752,000	0.01
1.07	0.02	3,400	0.12	4,896,000	0.01
1.10	0.02	3,500	0.13	5,040,000	0.01
1.13	0.02	3,600	0.14	5,184,000	0.01
1.17	0.02	3,700	0.14	5,328,000	0.01
1.20	0.02	3,800	0.15	5,472,000	0.01
1.23	0.02	3,900	0.16	5,616,000	0.01
1.26	0.02	4,000	0.17	5,760,000	0.01
1.29	0.03	4,100	0.18	5,904,000	0.01
1.32	0.03	4,200	0.19	6,048,000	0.01
1.36	0.03	4,300	0.19	6,192,000	0.01
1.39	0.03	4,400	0.20	6,336,000	0.02
1.42	0.03	4,500	0.21	6,480,000	0.02
1.45	0.03	4,600	0.22	6,624,000	0.02
1.48	0.03	4,700	0.23	6,768,000	0.02
1.51	0.04	4,800	0.24	6,912,000	0.02

DIAMETER THIRTY-SIX INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 1000 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
1.54	0.04	4,900	0.25	7,056,000	0.02
1.58	0.04	5,000	0.26	7,200,000	0.02
1.61	0.04	5,100	0.27	7,344,000	0.02
1.64	0.04	5,200	0.28	7,488,000	0.02
1.67	0.04	5,300	0.30	7,632,000	0.02
1.70	0.05	5,400	0.31	7,776,000	0.02
1.73	0.05	5,500	0.32	7,920,000	0.02
1.77	0.05	5,600	0.33	8,064,000	0.02
1.80	0.05	5,700	0.34	8,208,000	0.03
1.83	0.05	5,800	0.35	8,352,000	0.03
1.86	0.05	5,900	0.37	8,496,000	0.03
1.89	0.06	6,000	0.38	8,640,000	0.03
1.92	0.06	6,100	0.39	8,784,000	0.03
1.95	0.06	6,200	0.40	8,928,000	0.03
1.99	0.06	6,300	0.42	9,072,000	0.03
2.02	0.06	6,400	0.43	9,216,000	0.03
2.05	0.07	6,500	0.44	9,360,000	0.03
2.08	0.07	6,600	0.46	9,504,000	0.03
2.11	0.07	6,700	0.47	9,648,000	0.04
2.14	0.07	6,800	0.49	9,792,000	0.04
2.17	0.07	6,900	0.50	9,936,000	0.04
2.21	0.08	7,000	0.52	10,080,000	0.04
2.24	0.08	7,100	0.53	10,224,000	0.04
2.27	0.08	7,200	0.55	10,368,000	0.04

DIAMETER THIRTY-SIX INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 1000 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
2.30	0.08	7,300	0.56	10,512,000	0.04
2.33	0.08	7,400	0.58	10,656,000	0.04
2.36	0.09	7,500	0.59	10,800,000	0.04
2.40	0.09	7,600	0.61	10,944,000	0.05
2.43	0.09	7,700	0.62	11,088,000	0.05
2.46	0.09	7,800	0.64	11,232,000	0.05
2.49	0.10	7,900	0.66	11,376,000	0.05
2.52	0.10	8,000	0.67	11,520,000	0.05
2.55	0.10	8,100	0.69	11,664,000	0.05
2.58	0.10	8,200	0.71	11,808,000	0.05
2.62	0.11	8,300	0.73	11,952,000	0.05
2.65	0.11	8,400	0.74	12,096,000	0.06
2.68	0.11	8,500	0.76	12,240,000	0.06
2.71	0.11	8,600	0.78	12,384,000	0.06
2.74	0.12	8,700	0.80	12,528,000	0.06
2.77	0.12	8,800	0.82	12,672,000	0.06
2.81	0.12	8,900	0.83	12,816,000	0.06
2.84	0.13	9,000	0.85	12,960,000	0.06
2.87	0.13	9,100	0.87	13,104,000	0.06
2.90	0.13	9,200	0.89	13,248,000	0.07
2.93	0.13	9,300	0.91	13,392,000	0.07
2.96	0.14	9,400	0.93	13,536,000	0.07
2.99	0.14	9,500	0.95	13,680,000	0.07
3.03	0.14	9,600	0.97	13,824,000	0.07

DIAMETER THIRTY-SIX INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 1000 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
3.06	0.15	9,700	0.99	13,968,000	0.07
3.09	0.15	9,800	1.01	14,112,000	0.07
3.12	0.15	9,900	1.03	14,256,000	0.08
3.15	0.15	10,000	1.05	14,400,000	0.08
3.18	0.16	10,100	1.07	14,544,000	0.08
3.22	0.16	10,200	1.10	14,688,000	0.08
3.25	0.16	10,300	1.12	14,832,000	0.08
3.28	0.17	10,400	1.14	14,976,000	0.08
3.31	0.17	10,500	1.16	15,120,000	0.09
3.34	0.17	10,600	1.18	15,264,000	0.09
3.37	0.18	10,700	1.21	15,408,000	0.09
3.40	0.18	10,800	1.23	15,552,000	0.09
3.44	0.18	10,900	1.25	15,696,000	0.09
3.47	0.19	11,000	1.27	15,840,000	0.09
3.50	0.19	11,100	1.30	15,984,000	0.10
3.53	0.19	11,200	1.32	16,128,000	0.10
3.56	0.20	11,300	1.34	16,272,000	0.10
3.59	0.20	11,400	1.37	16,416,000	0.10
3.62	0.20	11,500	1.39	16,560,000	0.10
3.66	0.21	11,600	1.42	16,704,000	0.11
3.69	0.21	11,700	1.44	16,848,000	0 11
3.72	0.22	11,800	1.47	16,992,000	0.11
3.75	0.22	11,900	1.49	17,136,000	0.11
3.78	0.22	12,000	1.52	17,280,000	0.11

DIAMETER THIRTY-SIX INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 1000 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
3.81	0.23	12,100	1.54	17,424,000	0.11
3.85	0.23	12,200	1.57	17,568,000	0.12
3.88	0.23	12,300	1.59	17,712,000	0.12
3.91	0.24	12,400	1.62	17,856,000	0.12
3.94	0.24	12,500	1.64	18,000,000	0.12
3.97	0.25	12,600	1.67	18,144,000	0.12
4.00	0.25	12,700	1.70	18,288,000	0.13
4.03	0.25	12,800	1.72	18,432,000	0.13
4.07	0.26	12,900	1.75	18,576,000	0.13
4.10	0.26	13,000	1.78	18,720,000	0.13
4.13	0.27	13,100	1.81	18,864,000	0.13
4.16	0.27	13,200	1.83	19,008,000	0.14
4.19	0.27	13,300	1.86	19,152,000	0.14
4.22	0.28	13,400	1.89	19,296,000	0.14
4.26	0.28	13,500	1.92	19,440,000	0.14
4.29	0.29	13,600	1.95	19,584,000	0.14
4.32	0.29	13,700	1.98	19,728,000	0.15
4.35	0.29	13,800	2.01	19,872,000	0.15
4.38	0.30	13,900	2.03	20,016,000	0.15
4.41	0.30	14,000	2.06	20,160,000	0.15
4.44	0.31	14,100	2.09	20,304,000	0.16
4.48	0.31	14,200	2.12	20,448,000	0.16
4.51	0.32	14,300	2.15	20,592,000	0.16
4.54	0.32	14,400	2.18	20,736,000	0.16

DIAMETER THIRTY-SIX INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 1000 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
4.57	0.32	14,500	2.21	20,880,000	0.16
4.60	0.33	14,600	2.24	21,024,000	0.17
4.63	0.33	14,700	2.28	21,168,000	0.17
4.66	0.34	14,800	2.31	21,312,000	0.17
4.70	0.34	14,900	2.34	21,456,000	0.17
4.73	0.35	15,000	2.37	21,600,000	0.18
4.76	0.35	15,100	2.40	21,744,000	0.18
4.79	0.36	15,200	2.43	21,888,000	0.18
4.82	0.36	15,300	2.46	22,032,000	0.18
4.85	0.37	15,400	2.50	22,176,000	0.18
4.89	0.37	15,500	2.53	22,320,000	0.19
4.92	0.38	15,600	2.56	22,464,000	0.19
4.95	0.38	15,700	2.60	22,608,000	0.19
4.98	0.39	15,800	2.63	22,752,000	0.19
5.01	0.39	15,900	2.66	22,896,000	0.20
5.04	0.40	16,000	2.70	23,040,000	0.20
5.07	0.40	16,100	2.73	23,184,000	0.20
5.11	0.41	16,200	2.76	23,328,000	0.20
5.14	0.41	16,300	2.80	23,472,000	0.21
5.17	0.42	16,400	2.83	23,616,000	0.21
5.20	0 42	16,500	2.87	23,760,000	0.21
5.23	0.43	16,600	2.90	23,904,000	0.21
5.26	0.43	16,700	2.94	24,048,000	0.22
5.30	0.44	16,800	2.97	24,192,000	0.22

DIAMETER THIRTY-SIX INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 1000 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
5.33	0.44	16,900	3.01	24,336,000	0.22
5.36	0.45	17,000	3.04	24,480,000	0.23
5.39	0.45	17,100	3.08	24,624,000	0.23
5.42	0.46	17,200	3.11	24,768,000	0.23
5.45	0.46	17,300	3.15	24,912,000	0.23
5.48	0.47	17,400	3.19	25,056,000	0.24
5.52	0.47	17,500	3.22	25,200,000	0.24
5.55	0.48	17,600	3.26	25,344,000	0.24
5.58	0.48	17,700	3.30	25,488,000	0.24
5.61	0.49	17,800	3.34	25,632,000	0.25
5.64	0.49	17,900	3.37	25,776,000	0.25
5.67	0.50	18,000	3.41	25,920,000	0.25
5.71	0.51	18,100	3.45	26,064,000	0.26
5.74	0.51	18,200	3.49	26,208,000	0.26
5.77	0.52	18,300	3.53	26,352,000	0.26
5.80	0.52	18,400	3.56	26,496,000	0.26
5.83	0.53	18,500	3.60	26,640,000	0.27
5.86	0.53	18,600	3.64	26,784,000	0.27
5.89	0.54	18,700	3.68	26,928,000	0.27
5.93	0.55	18,800	3.72	27,072,000	0.28
5.96	0.55	18,900	3.76	27,216,000	0.28
5.99	0.56	19,000	3.80	27,360,000	0.28
6.02	0.56	19,100	3.84	27,504,000	0.28
6.05	0.57	19,200	3.88	27,648,000	0.29

DIAMETER THIRTY-SIX INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 1000 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
6.08	0.58	19,300	3.92	27,792,000	0.29
6.11	0.58	19,400	3.96	27,936,000	0.29
6.15	0.59	19,500	4.00	28,080,000	0.30
6.18	0.59	19,600	4.04	28,224,000	0.30
6.21	0.60	19,700	4.09	28,368,000	0.30
6.24	0.61	19,800	4.13	28,512,000	0.31
6.27	0.61	19,900	4.17	28,656,000	0.31
6.30	0.62	20,000	4.21	28,800,000	0.31

DIAMETER FORTY-EIGHT INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 1000 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
0.04	0.00	200	0.00	288,000	0.00
0.07	0.00	400	0.00	576,000	0.00
0.11	0.00	600	0.00	864,000	0.00
0.14	0.00	800	0.00	1,152,000	0.00
0.18	0.00	1,000	0.01	1,440,000	0.00
0.21	0.00	1,200	0.01	1,728,000	0.00
0.25	0.00	1,400	0.01	2,016,000	0.00
0.28	0.00	1,600	0.01	2,304,000	0.00
0.32	0.00	1,800	0.01	2,592,000	0.00
0.35	0.00	2,000	0 01	2,880,000	0.00
0.39	0.00	2,200	0.01	3,168,000	0.00
0.43	0.00	2,400	0.01	3,456,000	0.00
0.46	0.00	2,600	0.02	3,744,000	0.00
0.50	0.00	2,800	0.02	4,032,000	0.00
0.53	0.00	3,000	0.02	4,320,000	0.00
0.57	0.01	3,200	0.03	4,608,000	0.00
0.60	0.01	3,400	0.03	4,896,000	0.00
0.64	0.01	3,600	0.03	5,184,000	0.00
0.67	0.01	3,800	0.04	5,472,000	0.00
0.71	0.01	4,000	0.04	5,760,000	0.00
0.74	0.01	4,200	0.04	6,048,000	0.00
0.78	0.01	4,400	0.05	6,336,000	0.00
0.82	0.01	4,600	0.05	6,624,000	0.01
0.85	0.01	4,800	0.06	6,912,000	0.01

DIAMETER FORTY-EIGHT INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 1000 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
0.89	0.01	5,000	0.06	7,200,000	0.01
0.92	0.01	5,200	0.07	7,488,000	0.01
0.96	0.01	5,400	0.07	7,776,000	0.01
0.99	0.02	5,600	0.08	8,064,000	0.01
1.03	0.02	5,800	0.08	8,352,000	0.01
1.06	0.02	6,000	0.09	8,640,000	0.01
1.10	0.02	6,200	0.10	8,928,000	0.01
1.13	0.02	6,400	0.10	9,216,000	0.01
1.17	0.02	6,600	0.11	9,504,000	0.01
1.21	0.02	6,800	0.11	9,792,000	0.01
1.24	0.02	7,000	0.12	10,080,000	0.01
1.28	0.03	7,200	0.13	10,368,000	0.01
1.31	0.03	7,400	0.14	10,656,000	0.01
1.35	0.03	7,600	0.14	10,944,000	0.01
1.38	0.03	7,800	0.15	11,232,000	0.02
1.42	0.03	8,000	0.16	11,520,000	0.02
1.45	0.03	8,200	0.17	11,808,000	0.02
1.49	0.03	8,400	0.18	12,096,000	0.02
1.52	0.04	8,600	0.18	12,384,000	0.02
1.56	0.04	8,800	0.19	12,672,000	0.02
1.60	0.04	9,000	0.20	12,960,000	0.02
1.63	0.04	9,200	0.21	13,248,000	0.02
1.67	0.04	9,400	0.22	13,536,000	0.02
1.70	0.05	9,600	0.23	13,824,000	0.02

DIAMETER FORTY-EIGHT INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 1000 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
1.74	0.05	9,800	0.24	14,112,000	0.02
1.77	0.05	10,000	0.25	14,400,000	0.02
1.81	0.05	10,200	0.26	14,688,000	0.03
1.84	0.05	10,400	0.27	14,976,000	0.03
1.88	0.05	10,600	0.28	15,264,000	0.03
1.91	0.06	10,800	0.29	15,552,000	0.03
1.95	0.06	11,000	0.30	15,840,000	0.03
1.99	0.06	11,200	0.31	16,128,000	0.03
2.02	0.06	11,400	0.32	16,416,000	0.03
2.06	0.07	11,600	0.33	16,704,000	0.03
2.09	0.07	11,800	0.35	16,992,000	0.03
2.13	0.07	12,000	0.36	17,280,000	0.04
2.16	0.07	12,200	0.37	17,568,000	0.04
2.20	0.08	12,400	0.38	17,856,000	0.04
2.23	0.08	12,600	0.39	18,144,000	0.04
2.27	0.08	12,800	0.41	18,432,000	0.04
2.30	0.08	13,000	0.42	18,720,000	0.04
2.34	0.09	13,200	0.43	19,008,000	0.04
2.38	0.09	13,400	0.45	19,296,000	0.04
2.41	0.09	13,600	0.46	19,584,000	0.05
2.45	0.09	13,800	0.47	19,872,000	0.05
2.48	0.10	14,000	0.49	20,160,000	0.05
2.52	0.10	14,200	0.50	20,448,000	0.05
2.55	0.10	14,400	0.51	20,736,000	0.05

DIAMETER FORTY-EIGHT INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 1000 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
2.59	0.10	14,600	0.53	21,024,000	0.05
2.62	0.11	14,800	0.54	21,312,000	0.05
2.66	0.11	15,000	0.56	21,600,000	0.06
2.70	0.11	15,200	0.57	21,888,000	0.06
2.73	0.12	15,400	0.59	22,176,000	0.06
2.77	0.12	15,600	0.60	22,464,000	0.06
2.80	0.12	15,800	0.62	22,752,000	0.06
2.84	0.13	16,000	0.64	23,040,000	0.06
2.87	0.13	16,200	0.65	23,328,000	0.06
2.91	0.13	16,400	0.67	23,616,000	0.07
2.94	0.13	16,600	0.68	23,904,000	0.07
2.98	0.14	16,800	0.70	24,192,000	0.07
3.01	0.14	17,000	0.72	24,480,000	0.07
3.05	0.14	17,200	0.73	24,768,000	0.07
3.09	0.15	17,400	0.75	25,056,000	0.07
3.12	0.15	17,600	0.77	25,344,000	0.08
3.16	0.15	17,800	0.79	25,632,000	0.08
3.19	0.16	18,000	0.80	25,920,000	0.08
3.23	0.16	18,200	0.82	26,208,000	0.08
3.26	0.17	18,400	0.84	26,496,000	0.08
3.30	0.17	18,600	0.86	26,784,000	0.09
3.33	0.17	18,800	0.88	27,072,000	0.09
3.37	0.18	19,000	0.90	27,360,000	0.09
3.40	0.18	19,200	0.91	27,648,000	0.09

DIAMETER FORTY-EIGHT INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 1000 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
3.44	0.18	19,400	0.93	27,936,000	0.09
3.48	0.19	19,600	0.95	28,224,000	0.09
3.51	0.19	19,800	0.97	28,512,000	0.10
3.55	0.20	20,000	0.99	28,800,000	0.10
3.58	0.20	20,200	1.01	29,088,000	0.10
3.62	0.20	20,400	1.03	29,376,000	0.10
3.65	0.21	20,600	1.05	29,664,000	0.10
3.69	0.21	20,800	1.07	29,952,000	0.11
3.72	0.22	21,000	1.09	30,240,000	0.11
3.76	0.22	21,200	1.12	30,528,000	0.11
3.79	0.22	21,400	1.14	30,816,000	0.11
3.83	0.23	21,600	1.16	31,104,000	0.12
3.87	0.23	21,800	1.18	31,392,000	0.12
3.90	0.24	22,000	1.20	31,680,000	0.12
3.94	0.24	22,200	1.22	31,968,000	0.12
3.97	0.25	22,400	1.25	32,256,000	0.12
4.01	0.25	22,600	1.27	32,544,000	0.13
4.04	0.25	22,800	1.29	32,832,000	0.13
4.08	0.26	23,000	1.31	33,120,000	0.13
4.11	0.26	23,200	1.34	33,408,000	0.13
4.15	0.27	23,400	1.36	33,696,000	0.14
4.18	0.27	23,600	1.38	33,984,000	0.14
4.22	0.28	23,800	1.41	34,272,000	0.14
4.26	0.28	24,000	1.43	34,560,000	0.14

DIAMETER FORTY-EIGHT INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 1000 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
4.29	0.29	24,200	1.45.	34,848,000	0.14
4.33	0.29	24,400	1.48	35,136,000	0.15
4.36	0.30	24,600	1.50	35,424,000	0.15
4.40	0.30	24,800	1.53	35,712,000	0.15
4.43	0.31	25,000	1.55	36,000,000	0.15
4.47	0.31	25,200	1.58	36,288,000	0.16
4.50	0.32	25,400	1.60	36,576,000	0.16
4.54	0.32	25,600	1.63	36,864,000	0.16
4.57	0.33	25,800	1.65	37,152,000	0.16
4.61	0.33	26,000	1.68	37,440,000	0.17
4.65	0.34	26,200	1.70	37,728,000	0.17
4.68	0.34	26,400	1.73	38,016,000	0.17
4.72	0.35	26,600	1.76	38,304,000	0.17
4.75	0.35	26,800	1.78	38,592,000	0.18
4.79	0.36	27,000	1.83	38,880,000	0.18
4.82	0.36	27,200	1.84	39,168,000	0.18
4.86	0.37	27,400	1.86	39,456,000	0.19
4.89	0.37	27,600	1.89	39,744,000	0.19
4.93	0.38	27,800	1.92	40,032,000	0.19
4.96	0.38	28,000	1.95	40,320,000	0.19
5.00	0.39	28,200	1.97	40,608,000	0.20
5.04	0.39	28,400	2.00	40,896,000	0.20
5.07	0.40	28,600	2.03	41,184,000	0.20
5.11	0.41	28,800	2.06	41,472,000	0.20

DIAMETER FORTY-EIGHT INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 1000 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
5.14	0.41	29,000	2.09	41,760,000	0.21
5.18	0.42	29,200	2.12	42,048,000	0.21
5.21	0.42	29,400	2.14	42,336,000	0.21
5.25	0.43	29,600	2.17	42,624,000	0.22
5.28	0.43	29,800	2.20	42,912,000	0.22
5.32	0.44	30,000	2.23	43,200,000	0.22
5.35	0.45	30,200	2.26	43,488,000	0.23
5.39	0.45	30,400	2.29	43,776,000	0.23
5.43	0.46	30,600	2.32	44,064,000	0.23
5.46	0.46	30,800	2.35	44,352,000	0.23
5.50	0.47	31,000	2.38	44,640,000	0.24
5.53	0.48	31,200	2.42	44,928,000	0.24
5.57	0.48	31,400	2.45	45,216,000	0.24
5.60	0.49	31,600	2.48	45,504,000	0.25
5.64	0.49	31,800	2.51	45,792,000	0.25
5.67	0.50	32,000	2.54	46,080,000	0.25
5.71	0.51	32,200	2.57	46,368,000	0.26
5.74	0.51	32,400	2.60	46,656,000	0.26
5.78	0.52	32,600	2.64	46,944,000	0.26
5.82	0.53	32,800	2.67	47,232,000	0.27
5.85	0.53	33,000	2.70	47,520,000	0.27
5.89	0.54	33,200	2.74	47,808,000	0.27
5.92	0.55	33,400	2.77	48,096,000	0.28
5.96	0.55	33,600	2.80	48,384,000	0.28

DIAMETER FORTY-EIGHT INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 1000 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
5.99	0.56	33,800	2.83	48,672,000	0.28
6.03	0.56	34,000	2.87	48,960,000	0.29
6.06	0.57	34,200	2.90	49,248,000	0.29
6.10	0.58	34,400	2.94	49,536,000	0.29
6.13	0.59	34,600	2.97	49,824,000	0.30
6.17	0.59	34,800	3.01	50,112,000	0.30
6.21	0.60	35,000	3.04	50,400,000	0.30

DIAMETER SIXTY INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 1000 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
0.05	0.00	400	0.001	576,000	0.00
0.09	0.00	800	0.002	1,152,000	0.00
0.14	0.00	1,200	0.003	1,728,000	0.00
0.18	0.00	1,600	0.004	2,304,000	0.00
0.23	0.00	2,000	0.006	2,880,000	0.00
0.27	0.00	2,400	0.008	3,456,000	0.00
0.32	0.00	2,800	0.010	4,032,000	0.00
0.36	0.00	3,200	0.010	4,608,000	0.00
0.41	0.00	3,600	0.010	5,184,000	0.00
0.45	0.00	4,000	0.013	5,760,000	0.00
0.50	0.00	4,400	0.016	6,336,000	0.00
0.54	0.00	4,800	0.019	6,912,000	0.00
0.59	0.01	5,200	0.022	7,488,000	0.00
0.64	0.01	5,600	0.025	8,064,000	0.00
0.68	0.01	6,000	0.029	8,640,000	0.00
0.73	0.01	6,400	0.033	9,216,000	0.00
0.77	0.01	6,800	0.037	9,792,000	0.00
0.82	0.01	7,200	0.042	10,368,000	0.01
0.86	0.01	7,600	0.047	10,944,000	0.01
0.91	0.01	8,000	0.052	11,520,000	0.01
0.95	0.01	8,400	0.057	12,096,000	0.01
1.00	0.02	8,800	0.063	12,672,000	0.01
1.04	0.02	9,200	0.069	13,248,000	0.01
1.09	0.02	9,600	0.075	13,824,000	0.01

DIAMETER SIXTY INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 1000 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
1.13	0.02	10,000	0.081	14,400,000	0.01
1.18	0.02	10,400	0.088	14,976,000	0.01
1.23	0.02	10,800	0.094	15,552,000	0.01
1.27	0.03	11,200	0.102	16,128,000	0.01
1.32	0.03	11,600	0.109	16,704,000	0.01
1.36	0.03	12,000	0.117	17,280,000	0.01
1.41	0.03	12,400	0.124	17,856,000	0.02
1.45	0.03	12,800	0.133	18,432,000	0.02
1.50	0.03	13,200	0.141	19,008,000	0.02
1.54	0.04	13,600	0.150	19,584,000	0.02
1.59	0.04	14,000	0.159	20,160,000	0.02
1.63	0.04	14,400	0.168	20,736,000	0.02
1.68	0.04	14,800	0.177	21,312,000	0.02
1.72	0.05	15,200	0.187	21,888,000	0.02
1.77	0.05	15,600	0.197	22,464,000	0.02
1.82	0.05	16,000	0.207	23,040,000	0.03
1.86	0.05	16,400	0.218	23,616,000	0.03
1.91	0.06	16,800	0.229	24,192,000	0.03
1.95	0.06	17,200	0.240	24,768,000	0.03
2.00	0.06	17,600	0.251	25,344,000	0.03
2.04	0.06	18,000	0.262	25,920,000	0.03
2.09	0.07	18,400	0.274	26,496,000	0.03
2.13	0.07	18,800	0.286	27,072,000	0.04
2.18	0.07	19,200	0.298	27,648,000	0.04

DIAMETER SIXTY INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 1000 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
2.22	0.08	19,600	0.311	28,224,000	0.04
2.27	0.08	20,000	0.324	28,800,000	0.04
2.31	0.08	20,400	0.337	29,376,000	0.04
2.36	0.09	20,800	0.350	29,952,000	0.04
2.41	0.09	21,200	0.364	30,528,000	0.05
2.45	0.09	21,600	0.378	31,104,000	0.05
2.50	0.10	22,000	0.392	31,680,000	0.05
2.54	0.10	22,400	0.406	32,256,000	0.05
2.59	0.10	22,800	0.421	32,832,000	0.05
2.63	0.11	23,200	0.436	33,408,000	0.05
2.68	0.11	23,600	0.451	33,984,000	0.06
2.72	0.12	24,000	0.466	34,560,000	0.06
2.77	0.12	24,400	0.482	35,136,000	0.06
2.81	0.12	24,800	0.498	35,712,000	0.06
2.86	0.13	25,200	0.514	36,288,000	0.06
2.90	0.13	25,600	0.531	36,864,000	0.07
2.95	0.14	26,000	0.547	37,440,000	0.07
3.00	0.14	26,400	0.564	38,016,000	0.07
3.04	0.14	26,800	0.582	38,592,000	0.07
3.09	0.15	27,200	0.599	39,168,000	0.07
3.13	0.15	27,600	0.617	37,744,000	0.08
3.18	0.16	28,000	0.635	40,320,000	0.08
3.22	0.16	28,400	0.653	40,896,000	0.08
3.27	0.17	28,800	0.672	41,472,000	0.08

DIAMETER SIXTY INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 1000 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
3.31	0.17	29,200	0.690	42,048,000	0.09
3.36	0.18	29,600	0.709	42,624,000	0.09
3.40	0.18	30,000	0.729	43,200,000	0.09
3.45	0.18	30,400	0.748	43,776,000	0.09
3.49	0.19	30,800	0.768	44,352,000	0.10
3.54	0.19	31,200	0.788	44,928,000	0.10
3.59	0.20	31,600	0.809	45,504,000	0.10
3.63	0.20	32,000	0.829	46,080,000	0.10
3.68	0.21	32,400	0.850	46,656,000	0.11
3.72	0.22	32,800	0.871	47,232,000	0.11
3.77	0.22	33,200	0.892	47,808,000	0.11
3.81	0.23	33,600	0.914	48,384,000	0.11
3.86	0.23	34,000	0.936	48,960,000	0.12
3.90	0.24	34,400	0.958	49,536,000	0.12
3.95	0.24	34,800	0.981	50,112,000	0.12
3.99	0.25	35,200	1.003	50,688,000	0.12
4.04	0.25	35,600	1.026	51,264,000	0.13
4.08	0.26	36,000	1.049	51,840,000	0.13
4.13	0.27	36,400	1.073	52,416,000	0.13
4.18	0.27	36,800	1.097	52,992,000	0.14
4.22	0.28	37,200	1.120	53,568,000	0.14
4.27	0.28	37,600	1.145	54,144,000	0.14
4.31	0.29	38,000	1.169	54,720,000	0.14
4.36	0.30	38,400	1.194	55,296,000	0.15

DIAMETER SIXTY INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 1000 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
4.40	0.30	38,800	1.219	55,872,000	0.15
4.45	0.31	39,200	1.244	56,448,000	0.16
4.49	0.31	39,600	1.270	57,024,000	0.16
4.54	0.32	40,000	1.296	57,600,000	0.16
4.58	0.33	40,400	1.322	58,176,000	0.16
4.63	0.33	40,800	1.348	58,752,000	0.17
4.68	0.34	41,200	1.374	59,328,000	0.17
4.72	0.35	41,600	1.401	59,904,000	0.17
4.77	0.35	42,000	1.428	60,480,000	0.18
4.81	0.36	42,400	1.456	61,056,000	0.18
4.86	0.37	42,800	1.483	61,632,000	0.19
4.90	0.37	43,200	1.511	62,208,000	0.19
4.95	0.38	43,600	1.539	62,784,000	0.19
4.99	0.39	44,000	1.568	63,360,000	0.20
5.04	0.39	44,400	1.596	63,936,000	0.20
5.08	0.40	44,800	1.625	64,512,000	0.20
5.13	0.41	45,200	1.654	65,088,000	0.21
5.17	0.42	45,600	1.684	65,664,000	0.21
5.22	0.42	46,000	1.713	66,240,000	0.21
5.27	0.43	46,400	1.743	66,816,000	0.22
5.31	0.44	46,800	1.773	67,392,000	0.22
5.36	0.45	47,200	1.804	67,968,000	0.23
5.40	0.45	47,600	1.835	68,544,000	0.23
5.45	0.46	48,000	1.866	69,120,000	0.23

DIAMETER SIXTY INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 1000 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
5.49	0.47	48,400	1.897	69,696,000	0.24
5.54	0.48	48,800	1.928	70,272,000	0.24
5.58	0.48	49,200	1.960	70,848,000	0.24
5.63	0.49	49,600	1.992	71,424,000	0.25
5.67	0.50	50,000	2.024	72,000,000	0.25
5.72	0.51	50,400	2.057	72,576,000	0.26
5.76	0.52	50,800	2.090	73,152,000	0.26
5.81	0.52	51,200	2.123	73,728,000	0.26
5.86	0.53	51,600	2.156	74,304,000	0.27
5.90	0.54	52,000	2.189	74,880,000	0.27
5.95	0.55	52,400	2.223	75,456,000	0.28
5.99	0.56	52,800	2.257	76,032,000	0.28
6.04	0.57	53,200	2.292	76,608,000	0.29
6.08	0.58	53,600	2.326	77,184,000	0.29
6.13	0.58	54,000	2.361	77,760,000	0.29
6.17	0.59	54,400	2.396	78,336,000	0.30
6.22	0.60	54,800	2.432	78,912,000	0.30
6.26	0.61	55,200	2.467	79,488,000	0.31
6.31	0.62	55,600	2.503	80,064,000	0.31
6.35	0.63	56,000	2.539	80,640,000	0.32
6.40	0.64	56,400	2.576	81,216,000	0.32
6.45	0.65	56,800	2.612	81,792,000	0.33
6.49	0.65	57,200	2.649	82,368,000	0.33
6.54	0.66	57,600	2 686	82,944,000	0.33

DIAMETER SIXTY INCH.

Mean Velocity of Water in Ft. per Second.	Head in Ft. required to produce this Velocity.	Discharge in U. S. Gallons per Minute.	Loss of Head in Ft. due to Friction, per 1000 Ft.	Discharge in U. S. Gallons per 24 Hours.	Loss of Head in Ft. due to the Orifice of Influx.
6.58	0.67	58,000	2.724	83,520,000	0.34
6.63	0.68	58,400	2.762	84,096,000	0.34
6.67	0.69	58,800	2.799	84,672,000	0.35
6.72	0.70	59,200	2.838	85,248,000	0.35
6.76	0.71	59,600	2.876	85,824,000	0.36
6.81	0.72	60,000	2.915	86,400,000	0.36
6.85	0.73	60,400	2.954	86,976,000	0.37
6.90	0.74	60,800	2.993	87,552,000	0.37
6.94	0.75	61,200	3.033	88,128,000	0.38
6.99	0.76	61,600	3.072	88,704,000	0.38
7.04	0.77	62,000	3.112	89,280,000	0.39
7.08	0.78	62,400	3.153	89,856,000	0.39
7.13	0.79	62,800	3.193	90,432,000	0.40
7.17	0.80	63,200	3.234	91,008,000	0.40
7.22	0.81	63,600	3.275	91,584,000	0.41
7.26	0.82	64,000	3.317	92,160,000	0.41
7.31	0.83	64,400	3.358	92,736,000	0.42
7.35	0.84	64,800	3.400	93,312,000	0.42

Supplementary Table A, of Theoretical Velocities, to be Used in Obtaining Results Beyond the Highest Limits of Table No. 2.

($2g = 64.4$.)

v	$\frac{v^2}{2g}$	v	$\frac{v^2}{2g}$	v	$\frac{v^2}{2g}$	v	$\frac{v^2}{2g}$
6.06	.57	8.10	1.02	13.2	2.7	26.0	10.5
6.11	.58	8.18	1.04	13.4	2.8	26.6	11.0
6.17	.59	8.26	1.06	13.7	2.9	27.2	11.5
6.22	.60	8.34	1.08	13.9	3.0	27.8	12.0
6.28	.61	8.41	1.10	14.1	3.1	28.4	12.5
6.32	.62	8.49	1.12	14.3	3.2	28.9	13.0
6.37	.63	8.57	1.14	14.5	3.3	29.5	13.5
6.42	.64	8.64	1.16	14.8	3.4	30.0	14.0
6.47	.65	8.72	1.18	15.0	3.5	30.5	14.5
6.52	.66	8.79	1.20	15.2	3.6	31.1	15.0
6.57	.67	8.87	1.22	15.4	3.7	31.6	15.5
6.61	.68	8.94	1.24	15.6	3.8	32.1	16.0
6.66	.69	9.01	1.26	15.8	3.9	32.6	16.5
6.71	.70	9.08	1.28	16.0	4.0	33.1	17.0
6.76	.71	9.15	1.30	16.4	4.2	33.6	17.5
6.81	.72	9.21	1.32	16.8	4.4	34.0	18.0
6.86	.73	9.29	1.34	17.2	4.6	34.5	18.5
6.91	.74	9.36	1.36	17.6	4.8	35.0	19.0
5.95	.75	9.43	1.38	17.9	5.0	35.4	19.5
6.99	.76	9.49	1.40	18.3	5.2	35.9	20.0
7.04	.77	9.57	1.42	18.7	5.4	36.3	20.5
7.09	.78	9.63	1.44	19.0	5.6	36.8	21.0
7.13	.79	9.70	1.46	19.3	5.8	37.2	21.5
7.18	.80	9.77	1.48	19.7	6.0	37.6	22.0
7.22	.81	9.83	1.50	20.0	6.2	38.1	22.5
7.26	.82	9.90	1.52	20.3	6.4	38.5	23.0
7.31	.83	9.96	1.54	20.6	6.6	38.9	23.5
7.35	.84	10.0	1.56	20.9	6.8	39.3	24.0
7.40	.85	10.1	1.58	21.2	7.0	39.7	24.5
7.44	.86	10.2	1.60	21.5	7.2	40.1	25.0
7.48	.87	10.3	1.65	21.8	7.4	40.9	26.0
7.53	.88	10.5	1.70	22.1	7.6	41.7	27.0
7.57	.89	10.6	1.75	22.4	7.8	42.5	28.0
7.61	.90	10.8	1.80	22.7	8.0	43.2	29.0
7.65	.91	10.9	1.85	23.0	8.2	43.9	30.0
7.70	.92	11.1	1.90	23.3	8.4	44.7	31.0
7.74	.93	11.2	1.95	23.5	8.6	45.4	32.0
7.78	.94	11.4	2.0	23.8	8.8	46.1	33.0
7.82	.95	11.7	2.1	24.1	9.0	46.7	34.0
7.86	.96	11.9	2.2	24 3	9.2	47.4	35.0
7.90	.97	12.2	2.3	24.6	9.4	48.1	36.0
7.94	.98	12.4	2.4	24.8	9.6	48.8	37.0
7.98	.99	12.6	2.5	25.1	9.8	49.5	38.0
8.03	1.00	12.9	2.6	25.4	10.0	50.1	39.0

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